



United States
Department of
Agriculture

Agricultural
Marketing
Service

Agricultural
Cooperative
Service

Marketing
Research Report
Number 1131

The U.S. Mushroom Industry

The Import Challenge



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THE U.S. MUSHROOM INDUSTRY:
THE IMPORT CHALLENGE

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ABSTRACT

Significant increases in imports of processed mushrooms have affected not only domestic processors and producers of processing mushrooms but also producers and handlers of fresh mushrooms. This report, commissioned by a Presidential task force charged with making recommendations as to future import policies, investigates the competitive stance of domestic mushroom processors with respect to their foreign counterparts. It describes the structure of the mushroom industry, with special emphasis on southeastern Pennsylvania, Maryland, and Delaware, and marketing of the product from grower to retail buyer.

This comprehensive study of the mushroom industry includes surveys of growers, repackers, canners, and major marketing and distribution firms to obtain production costs, sales, and marketing information. Included in the report are options upon which industry and Government initiatives might be focused to improve the industry's situation.

Keywords: Mushrooms, imports, marketing, costs of
production, processing,
merchandising, pricing.

ACKNOWLEDGEMENTS

Numerous individuals and organizations made important contributions toward this study. The authors convey sincere thanks to all those who so freely gave their consideration and time.

First, we are grateful for the information and assistance from all levels of the mushroom industry. These include growers of all sizes, the many repackers and bulk sellers, the large integrated firms, the processors, the wholesalers, and the retailers. The American Mushroom Institute was especially helpful, particularly in the early stages of the work.

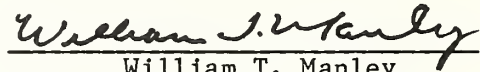
Likewise, many Federal, State, and local government offices aided us in our effort. The Council of Economic Advisers of the White House, the U.S. International Trade Commission, Pennsylvania State University, and several agencies within the U.S. Department of Agriculture provided information and counsel. The Agricultural Extension offices of Chester and Berks Counties, Pennsylvania, were especially helpful. Keith Zanzinger, Chester County agricultural agent, invested a great deal of time and effort in serving as a liaison in the southeastern Pennsylvania portions of the study.

Several offices and individuals of the Agricultural Marketing Service (AMS) and the Agricultural Cooperative Service (ACS) diligently worked through every phase of the study. Personnel of the Market Research and Development Division of AMS and the Cooperative Development Division of ACS made major contributions. Joe M. Bellah, Edmond S. Covey, Keith Dunn, and Thomas W. Weber spent many hours interviewing growers and preparing the data for analysis. Thanks are due to those who helped assemble this report. These include Harold S. Ricker and Stan Levin, who did substantial editing, and Daniel A. Swope who reviewed the manuscript. Larz F. Kremer prepared much of the graphics. Rose A. Giannantonio, Karen Goudy, and Nancy L. Johnson assisted in typing early parts of the drafts. And special thanks goes to Jackie Emmer who, time after time, graciously incorporated changes into the drafts and typed the final manuscript.

FOREWORD

The White House Task Force was established under a Presidential Memorandum dated October 17, 1980. Members of the task force were representatives of the Office of United States Trade Representative, the Council of Economic Advisers, the Small Business Administration, the Economic Development Administration, the Farmers Home Administration, and the Agricultural Marketing Service.

The task force was charged with providing appropriate technical and financial assistance to facilitate the mushroom industry's adjustment to increased imports. This report to the Task Force, prepared by the Agricultural Marketing Service, provides information that will assist in the adjustment process. The report was prepared by the Market Research and Development Division of the Agricultural Marketing Service, assisted by representatives from the Cooperative Development Division of the Agricultural Cooperative Service.



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Glossary

1. ACS: Agricultural Cooperative Service.
2. AMI: American Mushroom Institute.
3. AMS: Agricultural Marketing Service.
4. Bed plant: A mushroom growing operation characterized by stationary permanent beds.
5. Bulk seller: A firm whose major function is the assembly of processing mushrooms from growers for subsequent resale to canners and other processors.
6. Double: A concrete block building 38 by 60 feet, containing, on the average, 8,000 square feet of growing area.
7. Fill: The starting of the mushroom growing process when compost is loaded into the bed or trays.
8. Flush: The appearance of the mushroom on the surface of the bed or tray in the growing process.
9. Gross margin (gross processing margin): f.o.b. point of shipment price of canned mushrooms less applicable tariff, freight, container, and raw product costs.
10. Growing cycle: A period measured from the point in time when a mushroom house is filled until it is emptied, cleaned, and readied for the next fill.
11. Netmen: Independent mushroom buyers who subsequently pay growers on the basis of the New York price on the day following the sale, less transportation costs and the netman's commission.
12. PAMDEL: Acronym for the grower universe in Pennsylvania, Maryland, and Delaware, sampled during the industry survey.
13. Real prices: Prices derived by deflating the nominal price by the All Vegetable Crop Index, Statistical Reporting Service, U.S. Department of Agriculture.
14. Repacker: A firm that purchases bulk mushrooms from growers and sorts and repacks them in retail size containers for subsequent resale to wholesalers and other distributors.

GLOSSARY

15. SRS: The Statistical Reporting Service of the U.S. Department of Agriculture.
16. Strata: Categories of mushroom grower firm sizes. Stratum 1 firms had greater than zero but less than five doubles. Stratum 2 firms had five or more but less than thirteen doubles. Stratum 3 firms had thirteen or greater but less than twenty-one doubles. Stratum 4 firms had twenty-one or more doubles.
17. Toll-pack: Mushrooms canned for a repacker or similar firm who retains title to the product.
18. T-4: The four largest integrated firms in the mushroom industry, specifically Butler County Farms, Campbell Soup Company, Castle & Cooke, and Ralston Purina.
19. USITC: U.S. International Trade Commission.

Summary and
Conclusions

Imports of canned mushrooms have increased dramatically over the last few years, reaching a record level of 114 million pounds in 1979-80. Imports accounted for approximately 50 percent of the U.S. domestic market for canned mushrooms. Imports declined in the 1980-81 crop year to 96.5 million pounds drained weight. This decline has been attributed to the increase in U.S. tariff levels on imported canned mushrooms from 3.2 cents per pound drained weight plus 10 percent ad valorem to 3.2 cents per pound drained weight plus 30 percent ad valorem, effective November 1, 1980. The higher tariff level is scheduled to decline in successive increments of 5 percent ad valorem per year for 3 years and at the end of the third year to return to the initial level of 3.2 cents per pound drained weight plus 10 percent ad valorem.

This report assesses the competitive advantage of imports over domestically canned mushrooms, analyzes current industry practices, identifies specific industry problems, and develops a set of options--subject to Government or industry initiative --that can assist in solving identified problems.

Estimated gross margins on canned mushrooms for domestic canners were compared with those for a comparable style and container of canned mushrooms from South Korean and Taiwan sources. Gross margins available to domestic canners were considerably less than those of South Korean and Taiwan canners in the pretariff period. The competitive advantage was reduced, although not entirely eliminated, for certain styles and containers by the imposition of the tariff on U.S. canned mushroom imports in November 1980.

Raw product costs for domestic canners, as a percentage of case value, were from 189 to 272 percent higher than raw product costs of foreign canners for a comparable canned mushroom style and pack. Low raw product costs for South Korean and Taiwan canners are a reflection of low labor cost. The magnitudes of these cost differences are such that improvements in processing technology by domestic canners are not likely to reduce costs sufficiently to overcome the comparative advantage in production available to foreign canners. 1/

1/ This determination assumes that sales of processing mushrooms to canners must be at price levels sufficient to cover production costs and growers' normal profits. In the event that all growers are able to participate in fresh market sales, the blended return from both fresh and processed sales could be sufficient to support a sizable processing industry. In this situation, the fresh market would, in effect, subsidize the domestic processing industry.

SUMMARY AND CONCLUSIONS

Data on imported canned mushrooms were analyzed for over 34 months (January 1979–October 1981) for all exporting countries collectively and for each of the major exporting countries: Taiwan, South Korea, Hong Kong, and China. The higher tariff level, 3.2 cents per pound plus 30 percent ad valorem, was in effect over the last 12 months of the study period. Prior to imposition of the tariff, imports from all countries were trending upward. After the imposition of tariff, imports from Taiwan and South Korea trended down whereas imports from Hong Kong and China continued upward. This leads to the conclusion that the tariff has resulted in a reduced level of imports from Taiwan, South Korea, and all other countries, but has had a minimal effect on imports from Hong Kong and China.

Information on production and marketing practices, sales, and costs was obtained through a field survey of the various industry sectors, consisting of mushroom growers, repackers, mushroom canners, and wholesale and retail produce firms. The study population was concentrated in portions of the States of Pennsylvania, Maryland, and Delaware (PAMDEL). All data were restricted to the calendar year 1980.

Both actual (2.57) and estimated mushroom yields (2.80) were less than the national average yield of 3.12 pounds per square foot. The sample firms reported an average growing cycle of 102 days and 5.6 flushes per cycle, with smaller firms reporting longer cycles, 113 days and 6.3 flushes per cycle, and the largest firms reporting 94 days and 4.8 flushes per cycle.

Financial data obtained from growers indicated that 47 percent of all firms had outstanding production credit loans with an average loan value of \$45,891 per firm.

Mean and median variable costs incurred in mushroom production were estimated at \$0.571 and \$0.526 per pound, respectively, for PAMDEL growing firms. The cost analysis indicated that in many cases the survey firms were failing to cover estimated fixed costs. The lack of alternative uses for mushroom growing facilities and of alternative opportunities for many growers suggests that a substantial number of growers will continue to operate as long as revenues will cover variable costs. The normal adjustment process (exit of surplus firms) from a supply-side view is likely to be drawn out over a period of years.

Over 70 percent of production consisted of fresh market varieties (white and off-white mushrooms). Thirty-eight percent of all growers indicated that some part of their production (21 percent) was marketed in retail containers, indicating direct involvement of growers in the marketing

process. Cannerys, repackers, and wholesale distributors were the major outlets for growers. Netmen were also an important outlet accounting for 8 percent of sales.

Growers in general thought that a producer-owned marketing cooperative could conceivably improve mushroom marketing. More than one-half of those responding indicated a willingness to purchase stock in such a cooperative and sign a marketing agreement.

The survey identified "slow pay" by purchasers as a major problem facing mushroom growers. This problem was particularly acute for those growers selling to processors, and with the exception of sales through commission merchants, all indicated varying degrees of "slow pay." Growers have only a limited remedy to enforce prompt payment by repackers or canners where they have voluntarily accepted offered payment terms and have delivered a product subject to payment on these terms. Growers, packers, and canners should specify payment provisions in sales transactions.

Repackers constitute the growing sector's primary access to the fresh market. The repacker survey indicated receipts from growers of 56.0 million pounds of which 38.7 million pounds were sold fresh and 17.3 million pounds were sold to processors. The repackers reported selling 11.8 million pounds (30.0 percent) to chainstores and 24.9 million pounds (64.5 percent) to fruit and vegetable wholesalers, the most important market outlets for repackers.

None of the repackers contacted by the survey had a budget for sales promotion nor utilized specialized sales personnel in promoting mushroom sales. Apparently, the promotional efforts of the T-4 firms (large integrated growers) have had a substantial spill over effect on total fresh mushroom sales. 2/

Growers' access to the fresh market through direct sales to consumers and/or retail outlets, commission merchants, and netmen is relatively limited.

Most repackers surveyed had developed from a growing operation in order to assure themselves access to the fresh market with their production. To the extent that fresh mushroom receipts from other growers exceed fresh mushroom sales, the potential exists for repackers to favor their own production with fresh market prices versus processors' prices when allocating surplus mushrooms to canners. Growers shipping to repackers are

2/ T-4 Firms are Butler County Farms, Camsco (Campbell Soup Company), Castle and Cooke, and Ralston-Purina, Inc.

SUMMARY AND CONCLUSIONS

informed of the prices paid for fresh or processed mushrooms. Where the spread between the processed and fresh market price is relatively wide, processors may have difficulty in acquiring adequate supplies of processing stock. A judicious allocation of available fresh market sales among supplying growers by an associated repacking firm would tend to assure the processor of at least some minimal quantity of processing mushrooms.

There is the potential for abuse of market power in the absence of accounting practices or audits which would insure that mushrooms downgraded from No. 1 prime to a processing grade were actually utilized in the latter grade. In the absence of an audit, a grower receiving the processing price has no assurance that his mushrooms actually failed to make grade or that they were utilized in processing.

Data obtained from the survey of mushroom canners failed to provide adequate insight into processing industry problems. This was due to an inability to elicit the cooperation of all larger canning firms, the fragmentary nature of some of the data, and the bias introduced by a sample consisting mainly of the smaller firms. Nevertheless, the gross margin and import analysis has highlighted the inability of domestic canners to compete with imports under current conditions.

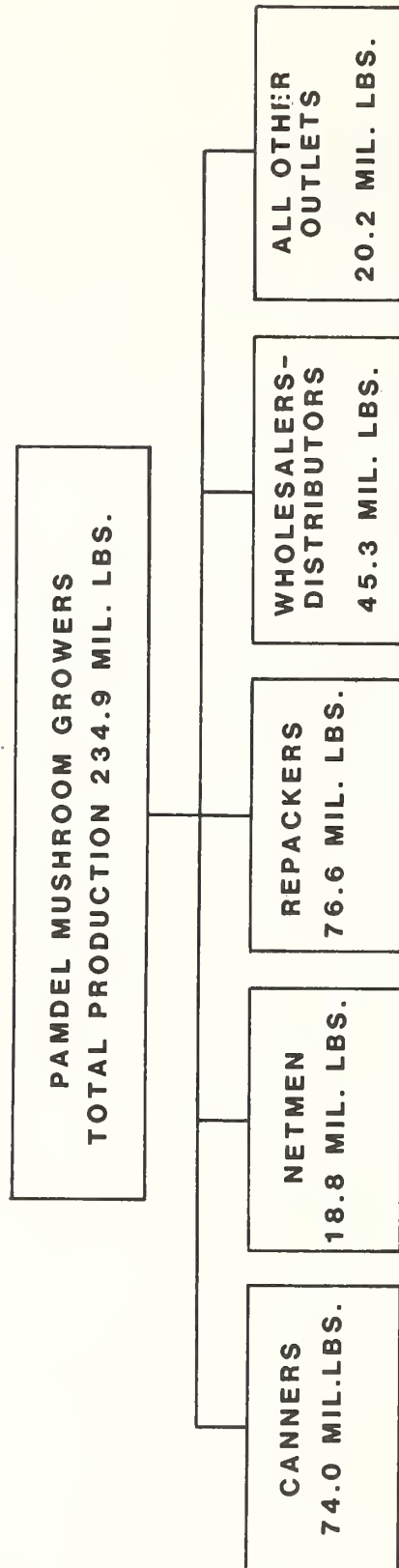
The survey of wholesale and retail distributors of fresh mushrooms provides a customer's view of the marketing sector of the mushroom industry. The identification of seasonality in both supplies and sales provides information which can be utilized in developing market oriented programs for both producers and marketing firms. Distributor respondents emphasized that quality, availability, dependability, and price--in descending order of importance--were the important criteria in selecting a supplier. The emphasis given to these factors implies the existence of major differences between market requirements for fresh and processed mushrooms.

Estimated total production for 1980 for PAMDEL growers was 234.9 million pounds, of which 117.1 million pounds (49.86 percent) were utilized in the fresh market (fig. 1).

The mushroom production and sales sector was divided into two separate groups for further analysis: PAMDEL and T-4 firms. Combined mushroom production amounted to 395.5 million pounds, of which 225.8 million pounds (57.1 percent) were sold fresh. The two groups combined accounted for 84 percent of total U.S. mushroom production and 75.3 percent of U.S. fresh mushroom sales. The analysis highlights the relative stability of T-4 firms in both production and sales, as compared with PAMDEL firms.

Shipments of fresh mushrooms from PAMDEL area firms to other market areas were estimated to range between 90.4 and 96.0 million pounds for 1980. Apparent consumption in those areas supplied by PAMDEL firms was estimated at 1.45 pounds per capita. This compares with estimated California consumption of 3.6 pounds per capita (Statistical Reporting Service production and other sales data).

Examination of the available industry and Government options suggests that expansion of the domestic market per capita consumption for fresh mushrooms is probably the most likely achievable alternative. Marketing orders, producer bargaining associations, and research and promotion programs are among the alternatives considered. The initiative for any course of action in the produce promotion area rests entirely with the industry. Import restrictions and other Government assistance programs are discussed as possible alternatives; but, the former would appear to be contrary to Government attitudes toward free trade with the major canned-mushroom-exporting countries; and, the latter consists primarily of specific shorter term types of loan or research assistance programs available to the industry.



SOURCE: PROJECTED FROM CALENDAR YEAR 1980 MUSHROOM INDUSTRY SURVEY
PAMDEL IS AN ACRONYM FOR PENNSYLVANIA, MARYLAND AND DELAWARE

Figure 1.--Estimated distribution of mushrooms from PAMDEL growers to primary outlets.

INTRODUCTION

Imports of canned mushrooms have become a major challenge to the U.S. mushroom industry in recent years. Imports increased from 50 million pounds (drained weight) in the marketing year 1974-75 to 86 million pounds in 1978-79, the last normal year before introduction of the new tariff. In 1979-80, imported canned mushrooms reached a record level of 114 million pounds, or over 50 percent of the total U.S. supply. In 1972, there were 35 mushroom-processing firms in the United States. The number of firms has since declined to 29 firms in 1976 and 23 firms in late 1979.

The domestic mushroom industry has repeatedly sought to obtain Government assistance in limiting imports. Industry action has taken the form of a series of petitions for import relief, originating in 1966, directed to the U.S. International Trade Commission (USITC). In March 1980 the American Mushroom Institute (AMI) again petitioned the USITC for import relief, alleging that increased imports of canned mushrooms had seriously injured the domestic industry and were forcing some domestic canners out of business.

An affirmative determination of the existence of the following conditions is required to support an USITC finding that import relief is justified (Section 201(b), Trade Act of 1974):

- There are increased imports (either actual or relative to domestic production) of an article into the United States;
- The domestic industry producing an article like or directly competitive with the imported article is being seriously injured or threatened with serious injury; and
- Such increased imports of an article are a substantial cause of serious injury, or the threat thereof, to the domestic industry producing an article like or directly competitive with the imported article.

The USITC initiated an investigation into the merits of the AMI petition, as required by law, on March 24, 1980. The Commission subsequently made the following determinations:

- The "like" product, canned mushrooms, does not include fresh mushrooms;
- Canning and processing are largely distinct from the production and sale of fresh mushrooms;
- The mushroom-processing industry is either suffering serious injury or is on the threshold of serious injury; and
- Increased imports (canned mushrooms) are a substantial cause or threat of serious injury that was found to exist.

In view of its affirmative finding and the compelling case presented by the industry (mushroom processors) producing the "like" product, the Commission found it unnecessary to address the alternative of "directly competitive." 3/

The USITC forwarded a recommendation to the President calling for import quotas at specified levels over the next 3 years to provide an opportunity for the domestic mushroom processing industry to adjust to imports. Under current law, the President has the option of:

- Accepting the USITC recommendations;
- Rejecting the recommendation and refusing to grant relief; or
- Rejecting the recommendation and substituting alternative relief measures.

A Presidential Proclamation was subsequently issued, increasing the current duty of 3.2 cents per pound plus 10 percent ad valorem to the following levels:

- First year of relief--3.2 cents per pound plus 30 percent ad valorem;
- Second year of relief--3.2 cents per pound plus 25 percent ad valorem;
- Third year of relief--3.2 cents per pound plus 20 percent ad valorem;

The decision to increase tariffs rather than impose a quota was based on an evaluation of the relative impact of both measures on U.S. international relations. The argument was advanced that U.S. trade relations with China, Taiwan, South Korea, and Hong Kong would be adversely affected by a quota because no conceivable quota allocation method would give China an acceptable market share without reducing the shares of other major suppliers. The tariff option had the decided advantage of placing an equal burden on all trading partners.

Statement of
the Problem

The International Trade Commission's investigations and findings focused on mushroom processing as the sector of the mushroom industry most affected by imports. Closer scrutiny, uninhibited by legal formulations, reveals that imports continue to impact adversely on every sector of the industry. The mushroom industry is a complex of interrelated raw

3/This is significant in the context of this report, which considers the mushroom industry as a single entity including both fresh and processed mushrooms, whereas tariff relief was granted on the basis of injury only to canners (handlers) of processed mushrooms.

and finished product flows, as depicted in figure 2. The industry conceptually is open to imports and assumes that the shortrun demand for both fresh and processed mushrooms is both constant and relatively inelastic.

Domestic processors faced with lower-priced imports are impacted by an inability to secure sufficient fresh mushrooms at prices which enable them to compete with imports. Domestic growers who have traditionally sold to processors, are impacted by the inability of processors to pay prices which cover production costs and by low fresh-market prices which result in part from the group's own activities in attempting to enter the fresh market. Low fresh mushroom prices also affect the profitability of growers who have traditionally served fresh market outlets.

The problem of low grower prices for both fresh and processed mushrooms, when coupled with inflationary pressures on prices of purchased inputs, has had an adverse impact on returns to mushroom growers. Combinations of low market prices, brought on by temporary market gluts, and internal production problems that result in reductions in output have created situations in which returns have failed to cover variable costs. For many growers, this situation has caused an erosion of working capital, thus necessitating a resort to higher-priced production credit and to even higher production costs.

Normally, firms failing to recover all costs, including fixed costs, may be expected to exit from the industry, with the consequent reduction in market supplies leading to higher prices and improved profitability for the survivors. Since the alternative-use value of a mushroom-growing operation approaches zero, exit is inhibited by an inability to realize a positive return on liquidation, which, in effect, freezes marginal firms in the industry and delays the adjustment process.

Objectives

The major objectives of this report are to examine in detail the major sectors of the domestic mushroom industry and to identify, where possible, specific sectoral and intersectoral problems and alternative solutions.

More specific objectives of the study are:

- To assess the competitive advantage of imported canned mushrooms over domestic production;
- To identify and describe the role of the various industry sectors and to determine product flows, production, selling and buying practices; sales promotion; and other specific industry practices for representative groups in the mushroom industry;

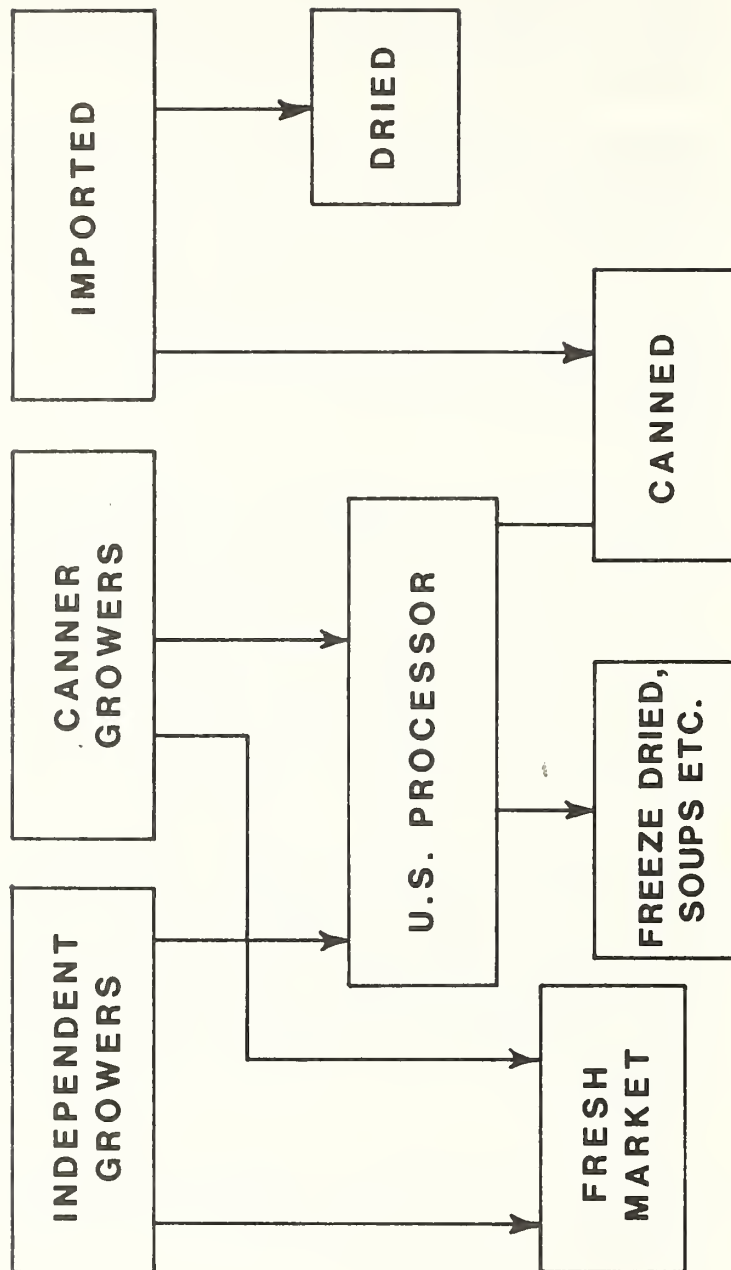


Figure 2.--Mushroom marketing channels

- To analyze current practices and identify specific problems, whose solutions would tend to promote more orderly marketing of mushrooms for both fresh and processed markets; and
- To develop a set of possible options that can assist in solving problems identified in the study, subject to government or industry initiative.

HISTORICAL PERSPECTIVE

Annual data on the U.S. mushroom industry indicate that in most dimensions the industry experienced an extremely favorable growth rate over the last decade. Production increased from 207 million pounds in 1970-71 to 471 million pounds in 1980-81, an annual compound growth rate of 8.6 percent (table 1). Sales to the fresh, or premium, market grew even more rapidly than production, increasing from 58 million pounds in 1970-71 to 267 million pounds in 1980-81, a compound growth rate of 16.5 percent. ^{4/} Sales to processors, including domestic canners, were less robust than either production or fresh market sales, increasing only modestly from 149 million pounds to 204 million pounds over the decade, for an annual compound growth of 3.2 percent. In the same period, sales of imported canned mushrooms increased from 43 million pounds to 148 million pounds annually, an annual compound growth rate of 13.2 percent, or slightly less than the annual compound growth rate for fresh mushrooms.

The apparent strength of the domestic industry lies in the growth of sales to the fresh market. The weakness lies in the slight-to-modest growth in sales to processors and the heavy inroads in the U.S. market made by imports of canned mushrooms. These aggregates do not, however, reflect many of the micro-level changes in the structure of the mushroom industry that occurred over the 10-year period. The entry of large integrated firms into the fresh market, geographical dispersion of both production and fresh mushroom sales, changes in the bottom-line profitability of old and new firms, and the decline in numbers and increased concentration of domestic canners are included in these structural changes.

Some evidence of the change in the relative position of domestic canners over the decade is shown in appendix A, table 1. These data indicate that most of the growth (3.5 percent annual compound rate) in domestic sales of processing mushrooms to other processors (noncanners) was only slightly higher than that evidenced by the domestic canning industry. An examination of sales to the fresh market over time indicates that the processing sector has become only a residual claimant for

^{4/}These figures do not reflect changes in utilization determined by this mushroom industry survey.

Table 1--U.S. mushroom production--fresh and processed sales, imports, and disappearance, 1970/71 - 80/81 crop years (fresh weight equivalents)

Period <u>1/</u>	Total production <u>2/</u>	Fresh market sales <u>2/</u>	Sales to processors <u>2/</u>	Imports <u>3/</u>	Total disappearance <u>4/</u>
<u>Million pounds</u>					
70/71	207	58	149	43	250
71/72	231	66	165	62	293
72/73	254	77	177	74	328
73/74	279	102	177	70	349
74/75	299	126	173	77	376
75/76	310	142	168	88	298
76/77	347	151	196	107	454
77/78	399	191	208	141	540
78/79	454	228	226	134	588
79/80	470	256	214	174	644
80/81	471	<u>5/</u> 267	<u>5/</u> 204	148	619
Annual compound growth rate-----	8.6%	16.5%	3.2%	13.2%	9.5%

1/ Crop year = July 1-June 30.

2/ Crop Reporting Service.

3/ U.S. Department of Commerce.

4/ Total disappearance is an aggregate that includes total imports and estimated production. It is not an estimate of consumption since it does not include loss incurred in the marketing system.

5/ These figures do not reflect changes in utilization determined by the survey.

mushrooms. This change is further highlighted in appendix A, table 2, which indicates that imports of canned mushrooms, which in 1970/71 were 17.2 percent of total disappearance, 20.8 percent of total U.S. production, and 28.9 percent total U.S. sales to processors, had increased in 1979/80 to 27.0, 37.0, and 81.1 percent, respectively.

Absolute increases in production and/or sales of a given commodity, although relevant as a measure of growth, are often more significant when computed on a per capita basis (appendix A, table 3). These data indicate a more than fourfold increase in per capita consumption of fresh mushrooms, from 0.29 pounds to 1.18 pounds per capita over the last decade. In the same period, sales to processors, including canners, nearly doubled. Total sales, or total disappearance per capita, from all sources increased from 1.24 pounds per capita in 1970-71 to 2.73 pounds in 1980-81.

GROSS-MARGIN ANALYSIS

The major objective of the gross-margin analysis was to determine and assess the competitive position of domestically canned mushrooms with imports. Other more specific objectives were to evaluate the probable impact of the tariff increase on gross margins available to major foreign suppliers and to assess the ability of U.S. canners to improve their competitive position through the adoption of new processing technology.

Estimated gross processing margins on imported canned mushrooms from South Korea and Taiwan were selected for comparison with estimated gross processing margins available to domestic canners (see appendix B, procedures). The analysis required a comparison of identical containers (in size and style of pack) of canned mushrooms from competing countries with comparable ones from the United States. The unit of comparison selected was the case. The value assigned to a case of mushrooms was the lowest quoted f.o.b. point of shipment price per case, for the equivalent size and style of pack to which freight costs were added for imported mushrooms from either Taiwan or South Korea. The analysis further distinguished between gross margins available for the period prior to November 1, 1980 (U.S. tariff rate 3.2 cents per pound plus 10 percent ad valorem) and the period after November 1, 1980 (U.S. tariff rate of 3.2 cents per pound plus 30 percent ad valorem). 5/

Gross processing margins were determined as the residual, or remaining value of the case after all other expenses were deducted. This value represented all other processing costs

5/ In order to simplify the explanations, the period prior to November 1, 1980, has been termed the pretariff period and the period following November 1, 1980, the posttariff period.

plus any profits to the canner. Figures 3 through 6 illustrate the gross margin comparisons. The three bars are of equal height, indicating that the same quantity and assigned value of canned mushrooms is involved. The percentage cost contributions shown are calculated as percentages of the case value indicated. Both a pretariff and posttariff situation are shown to provide some insight into the relative competitive positions of foreign and domestic canners before and after the new tariff was imposed.

Stems and pieces in 68-ounce cans: The pretariff (old tariff) comparative cost position for a case of six cans of 68-ounce stems and pieces is shown in figure 3. Case price was stipulated at \$29.93. Gross margins available to foreign suppliers under the old tariff were roughly 35 percent of value, compared to 15 percent available to domestic canners. In this pretariff period, raw product costs for domestic canners amounted to approximately 74 percent of case value, as compared with approximately 41 percent and 39 percent of case value for South Korea and Taiwan, respectively.

Gross processing margins for South Korean canners, posttariff, were reduced to approximately 12 percent of value from the 32 percent prevailing in the pretariff period. Gross margins available for Taiwan canners for the same product were reduced from 35 percent pretariff to approximately 15 percent posttariff, or roughly comparable to posttariff margins available to domestic canners. Domestic canners thus appeared to be competitive with Taiwan canners and to hold a slight competitive edge over South Korean canners.

Stems and buttons in 68-ounce cans: Pretariff gross processing margins for domestic, South Korean, and Taiwan processors of a case of six cans of 68-ounce slices and/or buttons amounted to 9, 27, and 31 percent of case value, respectively, figure 4. Case price or value in this instance amounted to \$28.75. Raw product costs for domestic canners made up roughly 79 percent of case value, compared with 44 percent of case value for South Korean canners and 42 percent for Taiwan canners.

Posttariff gross processing margins for South Korean canners declined to approximately 8 percent of case value or approximately 1 percent less than the gross margin available to domestic canners. Taiwan canners retained the competitive edge noted in the pretariff period; however, the gross margin available to these canners fell sharply, to approximately 11 percent of case value.

Stems and pieces in 4-ounce cans: The case price of 24 4-ounce cans of stems and pieces amounted to \$9.09 per case (fig. 5). Pretariff gross processing margins were found to be 16, 31, and

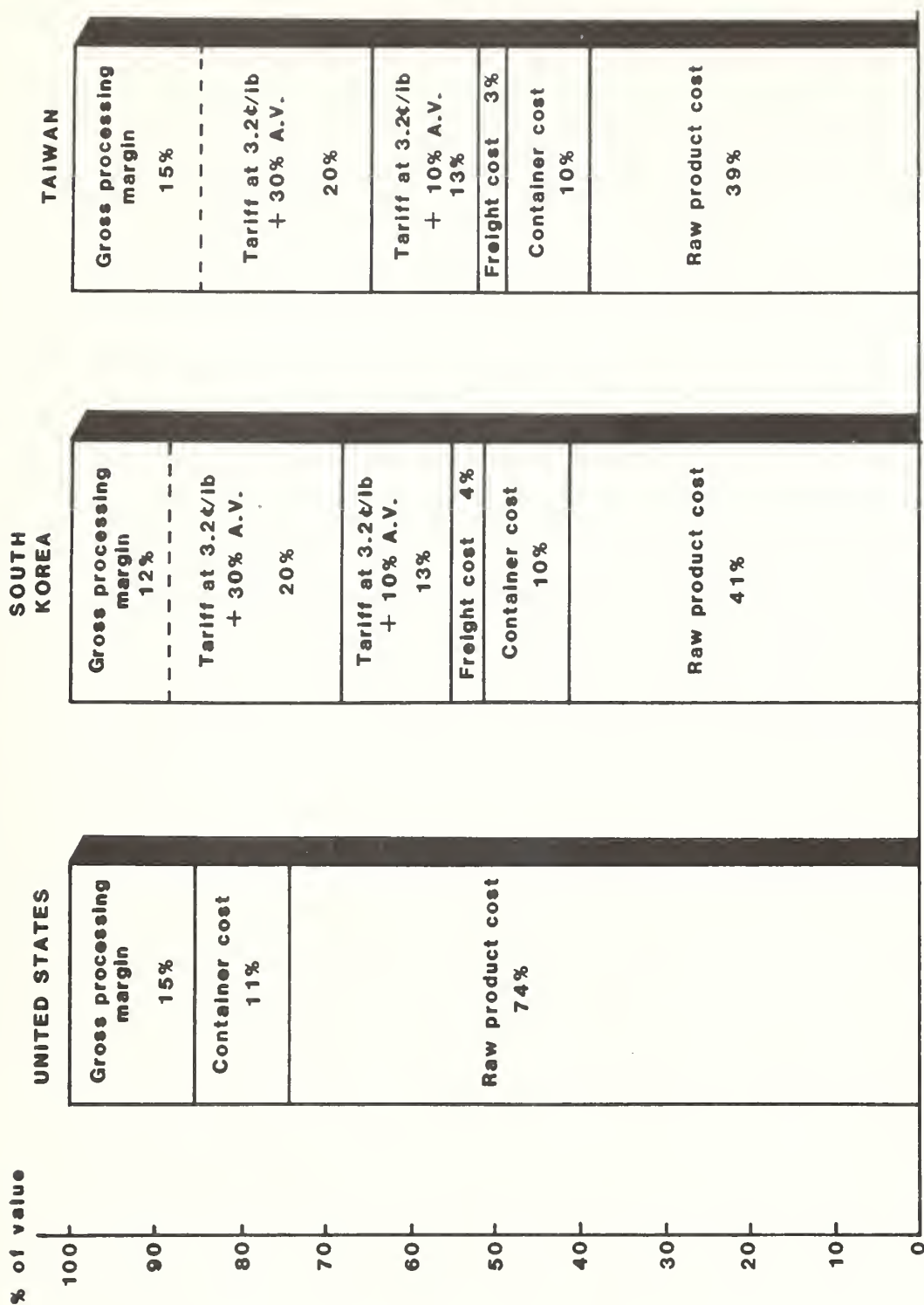


Figure 3.--Comparative cost position of a six 68-ounce case of stems and pieces

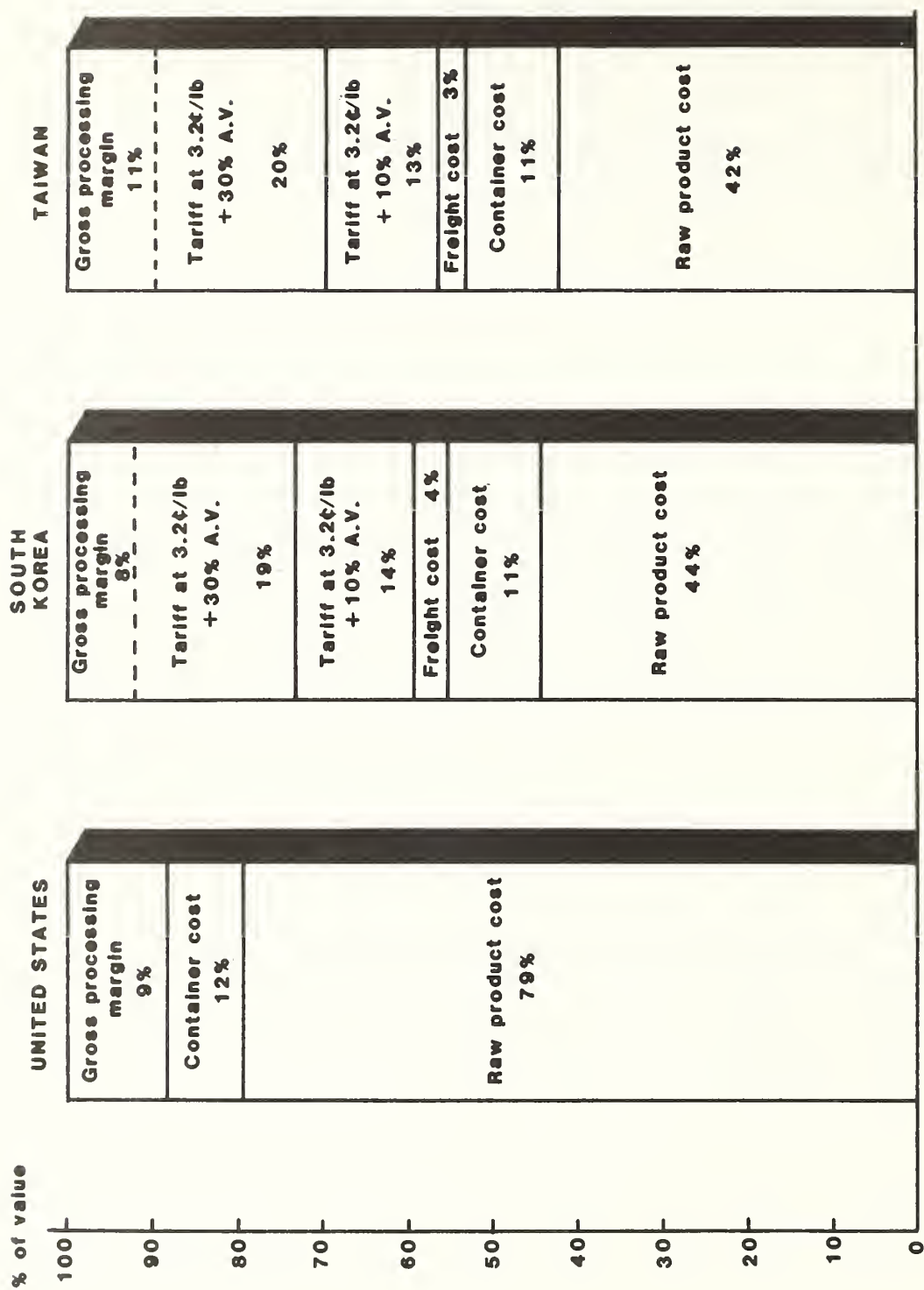


Figure 4.--Comparative cost position of a six 68-ounce case of slices and/or buttons

34 percent of case price for domestic, South Korean, and Taiwan canners, respectively. Raw product costs, as a percent of case price, amounted to 58 percent for domestic canners or approximately twice the raw product cost experienced by their South Korean and Taiwanese competitors. In the posttariff situation, gross processing margins for South Korean canners were less than the margin for domestic canners by approximately 4 percent of case price. Taiwan retained a slightly higher gross margin than South Korea, but was still below domestic canners by 2 percent of the case price.

Slices and buttons in 4-ounce cans: The available gross margin on a case of twenty-four 4-ounce cans of slices and buttons, valued at \$11.35 per case, amounted to 32 percent of case price for domestic canners in the pretariff period (fig. 6). Available gross margins for South Korean and Taiwan canners for the same size and style of pack amounted to 42 and 45 percent, respectively. In the posttariff situation, gross margins for South Korean and Taiwan canners declined to 23 and 25 percent of case price, respectively. Raw product costs in the posttariff situation amounted to roughly 25 percent of case price for both South Korean and Taiwan canners, compared with 41 percent of case price for domestic canners. The competitive edge enjoyed by domestic canners in terms of gross margin availability, 7 to 9 percent of case price in this situation, was the most substantial difference encountered in the analysis.

The major significance of the gross-margin analysis is that it highlights differences in raw product costs between domestic and foreign canners. The magnitude of these differences is such that it casts considerable doubt on the ability of domestic canners to regain a competitive edge through improvements in processing efficiency. In effect, differences in raw product costs between domestic and foreign canners appear to be too great to overcome through increased processing efficiency. This leads to the conclusion that domestic canners can remain viable in the absence of the higher tariff only if their raw product costs approach raw product costs of foreign canners plus freight and the normal import duty (3.2 cents per pound plus 10 percent ad valorem). Unfortunately, these raw product cost levels are substantially less than production costs for domestic mushroom growers.

IMPORT ANALYSIS

Data are available for the 12 months in which the increased tariff on canned mushrooms has been in effect. These data were analyzed in conjunction with monthly data on imports for the 22-month period immediately preceding the imposition of the tariff, November 1, 1980, to attempt to identify possible trends in imports and to evaluate the probable effectiveness

of the tariff. The import data for the combined 34-month period are summarized in appendix A, table 6. Figures 7 through 11 illustrate graphically total imports from all sources and the level of imports from major suppliers, Taiwan, South Korea, China, and Hong Kong, over the 34-month period.

An examination of figure 7, total imports from all countries over the 34-month period, does not appear to disclose a trend in the level of imports. When tested statistically, however, the data indicate an upward trend in imports that is statistically significant at the 5-percent level. The significant upward trend exhibited over the period tends to cloak any negative effect on the level of imports resulting from the imposition of the tariff in the last 12 months. A statistical test for imports from all countries for the last 12 months indicates a significant negative trend in imports. Similarly, a statistical test for trend for the 22 months preceding the tariff indicates a strong upward trend in the level of imports from all countries significant at the 5 percent level. Based on 1 year of data now available, the tariff has had an inhibiting effect on imports.

A clearer picture of shifts in the relative importance of the major canned mushroom suppliers, Taiwan, South Korea, Hong Kong, and China, over the 34-month period is illustrated in figures 8 through 11. Inspection of figure 8, imports from Taiwan, and figure 9, imports from South Korea, indicates a downward trend in imports from both countries over the 34-month period. A statistical test indicates a negative slope (downward trend), statistically significant for both countries at the 5 percent level. Similarly, a test for the last 12 months indicates a negative slope for both countries that is statistically significant at 5 percent.

An inspection of figure 10, Hong Kong, and figure 11, China, appears to indicate an upward trend in the level of exports of canned mushrooms to the United States over the 34-month period. This trend is confirmed statistically. Furthermore, the last 12 months of data on exports to the U.S. market from both countries also indicates a significant positive slope when tested for trend.

These findings can be summarized as follows:

1. The tariff has had a depressing effect on the level of canned mushroom imports from all countries over the last 12 months.
2. Up to the imposition of the tariff, there was a strong upward trend in canned mushroom imports from all countries.

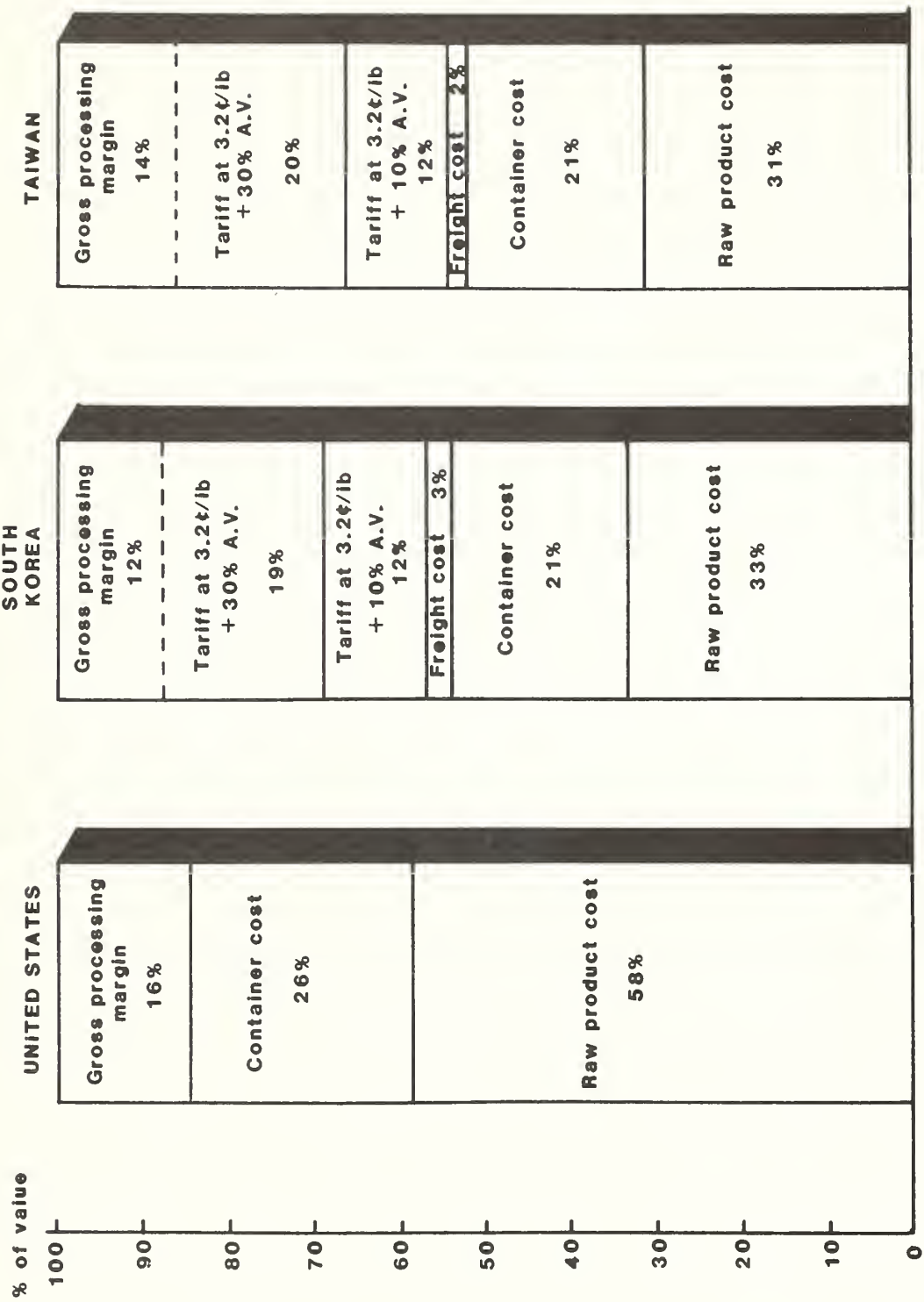


Figure 5.--Comparative cost position of a twenty-four 4-ounce case of stems and pieces

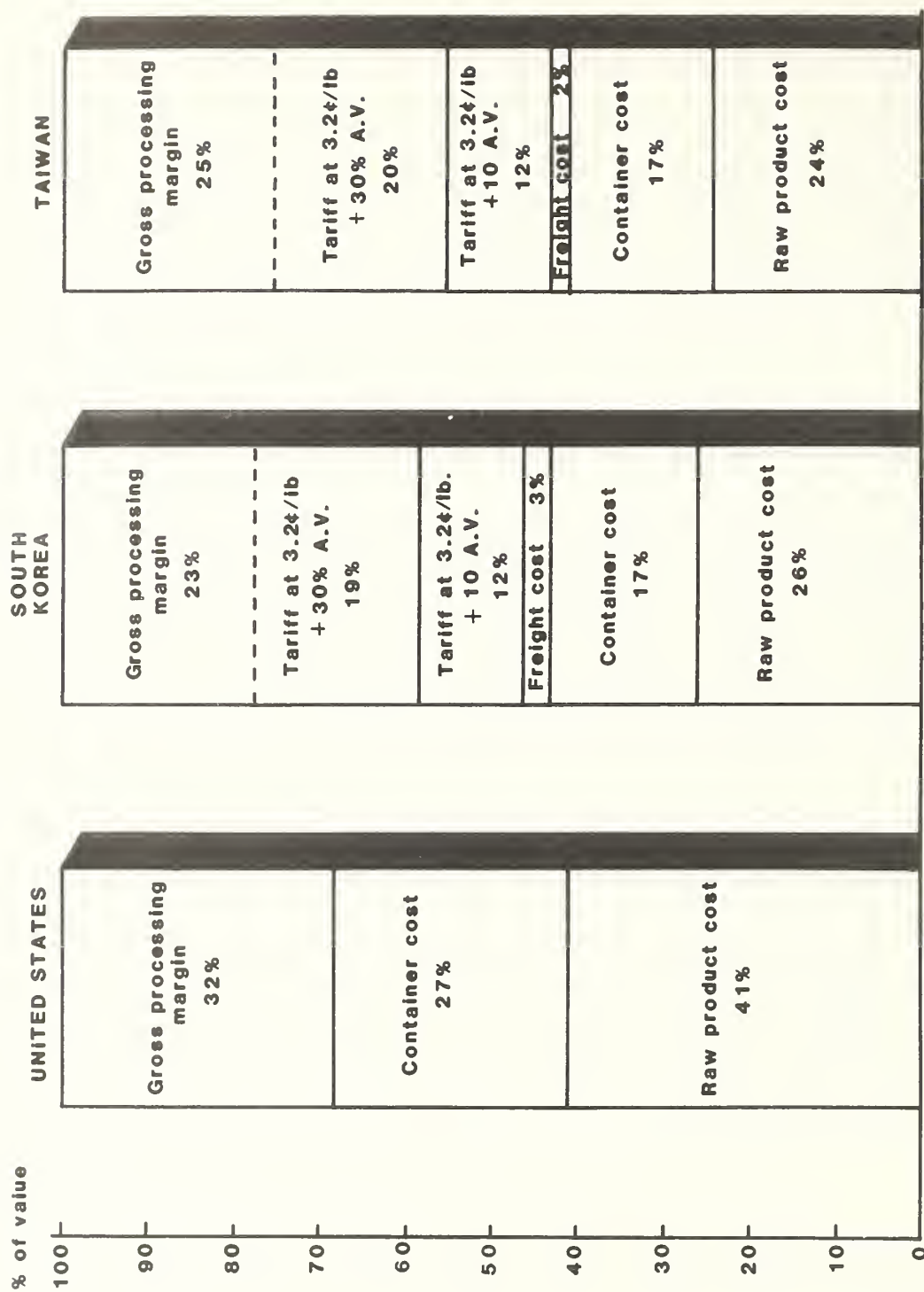
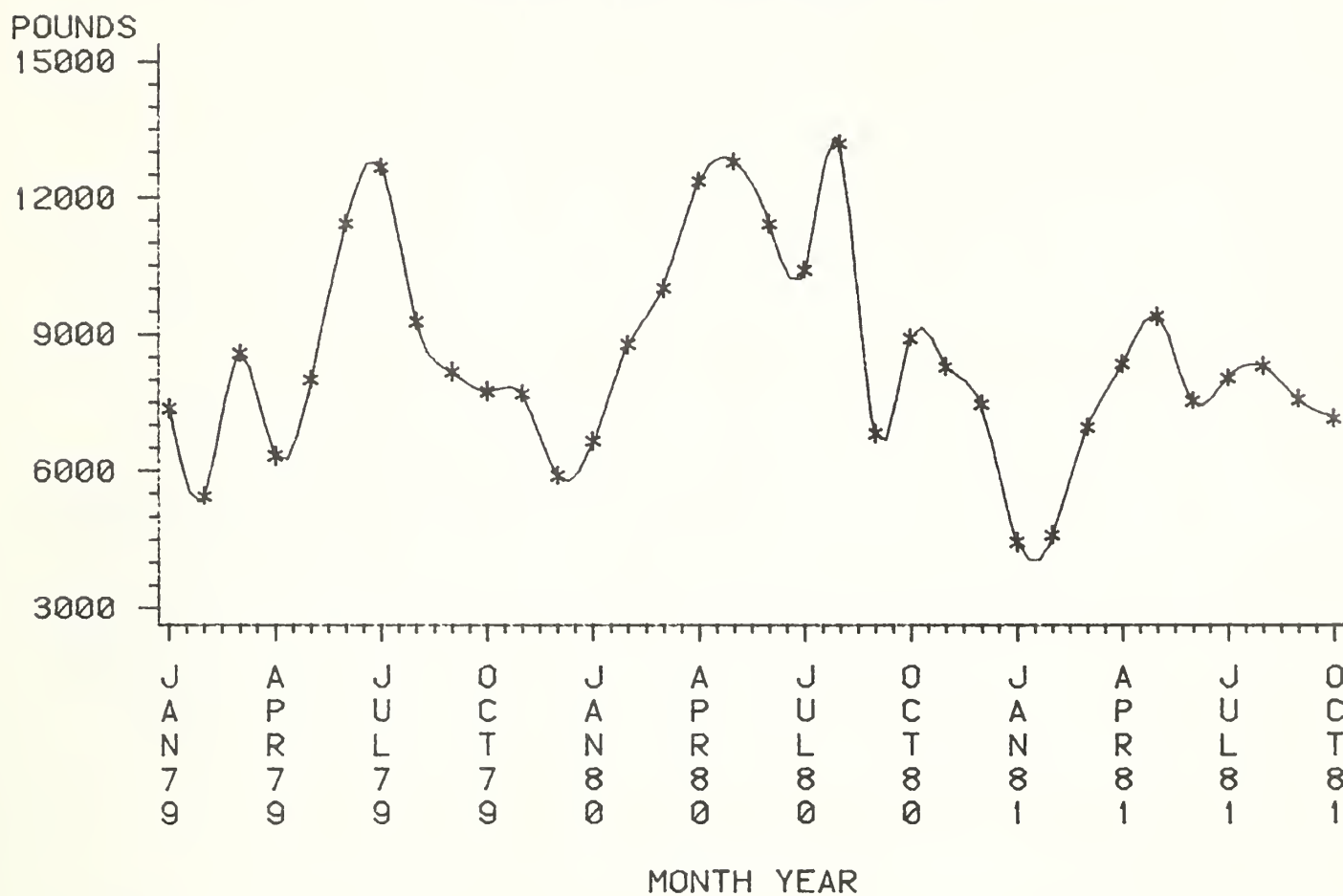


Figure 6.--Comparative cost position of a twenty-four 4-ounce case of slices and/or buttons

CANNED MUSHROOM IMPORTS FROM ALL SOURCES

JANUARY 1979 TO OCTOBER 1981



* IMPORT DATA IS IN THOUSANDS OF POUNDS
SOURCE: INTERNATIONAL TRADE COMMISSION

Figure 7.--Canned mushroom imports from all sources

3. Canned mushroom imports from Hong Kong and China evidenced an upward trend over the 34-month period.
4. The upward trend in imports of canned mushrooms from Hong Kong and China has continued since the imposition of the tariff.
5. There has been a downward trend in imports from Taiwan and South Korea for both the 34-month period and for the last 12 months since the imposition of the tariff. The trend in both cases was statistically significant.
6. The tariff has resulted in a reduced level of imports from all other countries, Taiwan and South Korea, but has had a minimal effect on imports from Hong Kong and China.

The shift in the relative importance of the major canned mushroom suppliers is summarized in table 2. These data emphasize the rather severe drop off in the relative importance of Taiwan and South Korea and the emergence of China and Hong Kong as major suppliers of canned mushrooms to the U.S. market. The data also emphasize the relatively small and constant shares of the U.S. market held by all other countries over the 34-month period. One exception not evident from these data was noted in the case of Macao, which became a canned mushroom supplier to the U.S. market in November 1980 and has continued to export to the U.S. market at levels ranging from 100,000 to 300,000 pounds, drained weight, per month.

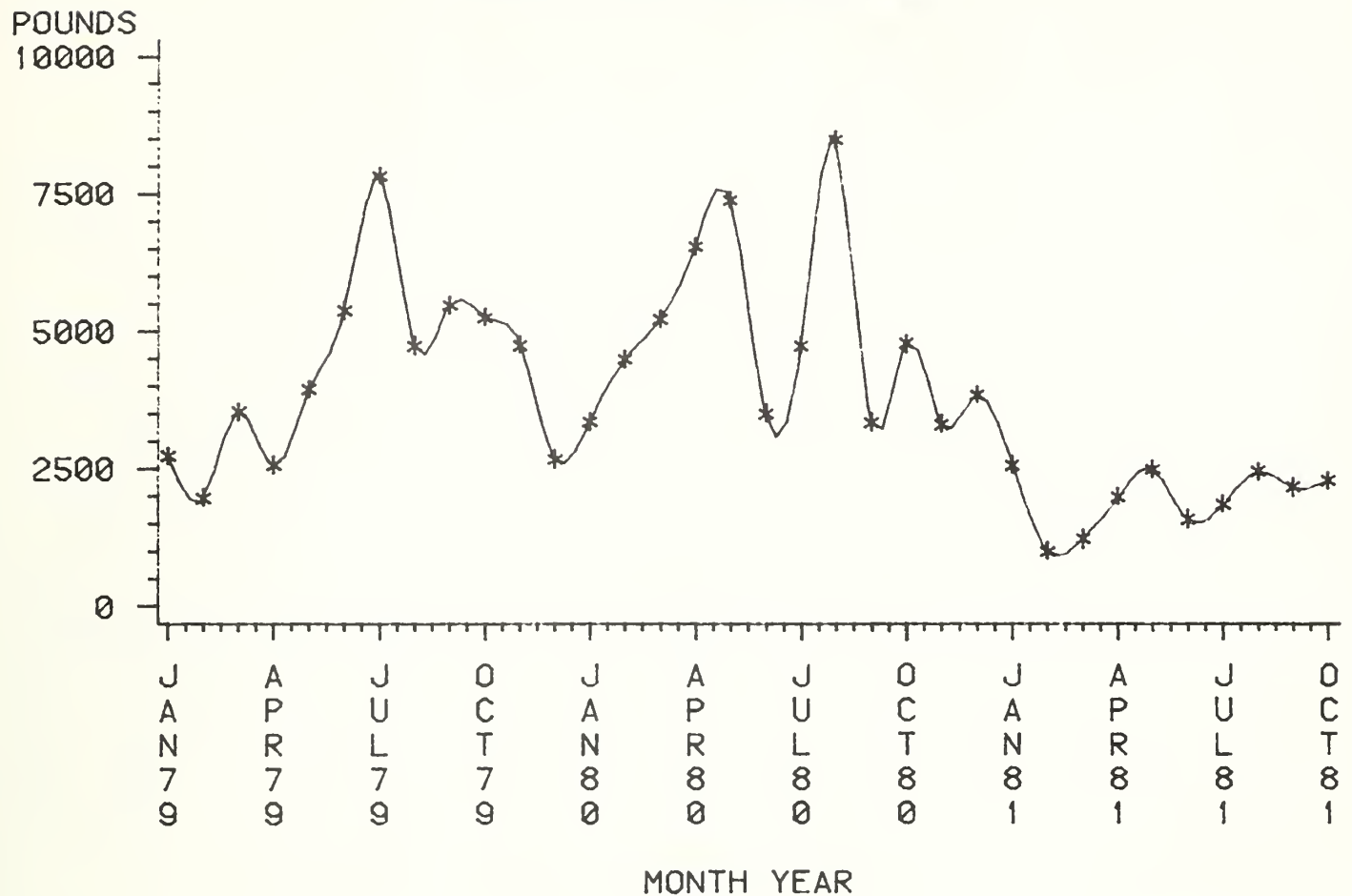
Table 2--U.S. canned mushroom imports, by country of origin, as a percentage of total annual canned mushroom imports from all sources, 1979-81

Year	Country of Origin						Total
	Taiwan	South Korea	China	Hong Kong	Others	Percent	
1979	51.6	29.0	.3	14.7	4.4		100
1980	50.5	16.5	12.6	16.0	4.4		100
1981 <u>1/</u>	27.1	12.5	29.5	26.3	4.6		100

1/ Percent of total U.S. imports from January through October 1981.

CANNED MUSHROOM IMPORTS FROM TAIWAN

JANUARY 1979 TO OCTOBER 1981

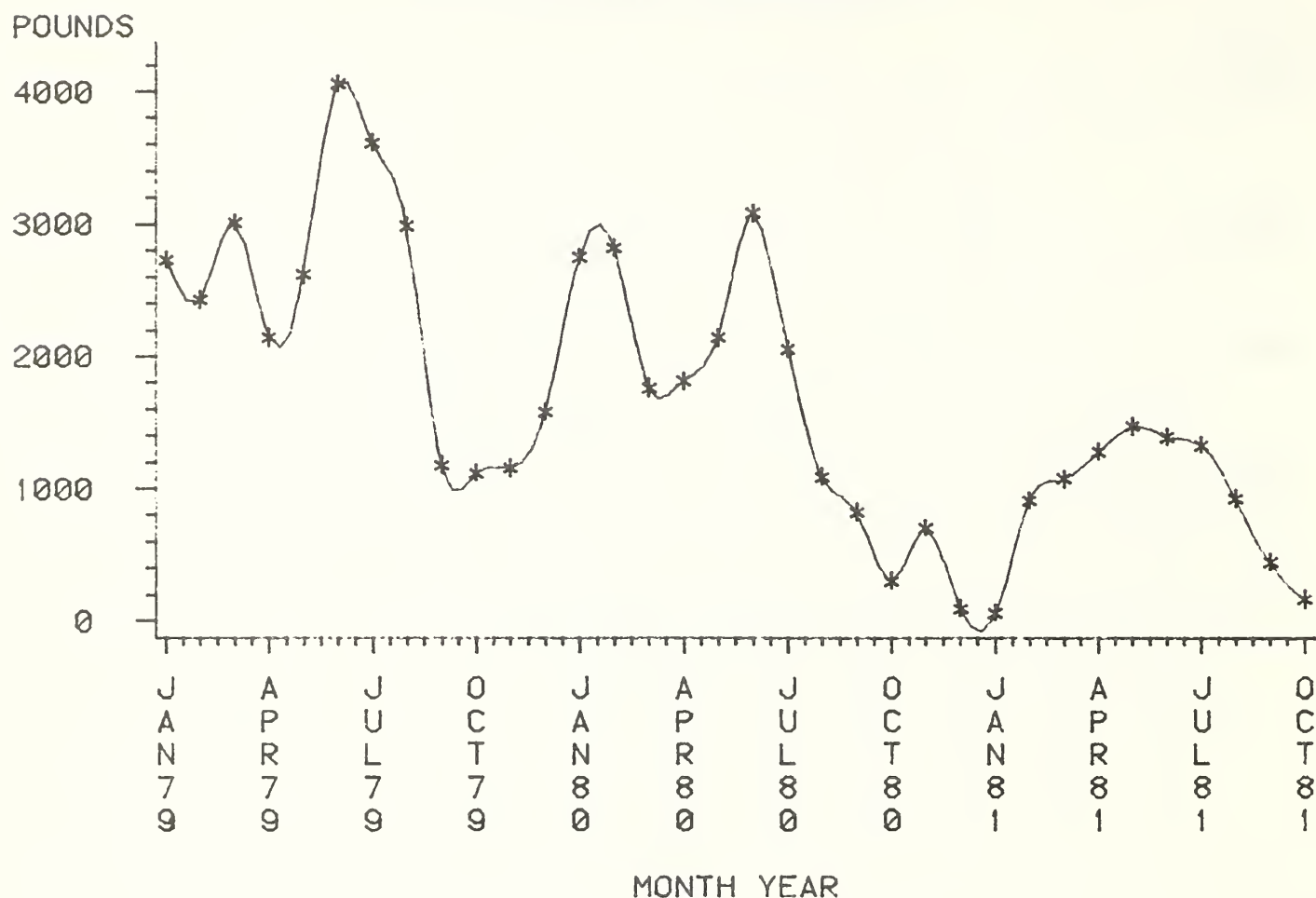


* IMPORT DATA IS IN THOUSANDS OF POUNDS.
SOURCE: INTERNATIONAL TRADE COMMISSION

Figure 8.--Canned mushroom imports from Taiwan

CANNED MUSHROOM IMPORTS FROM SOUTH KOREA

JANUARY 1979 TO OCTOBER 1981

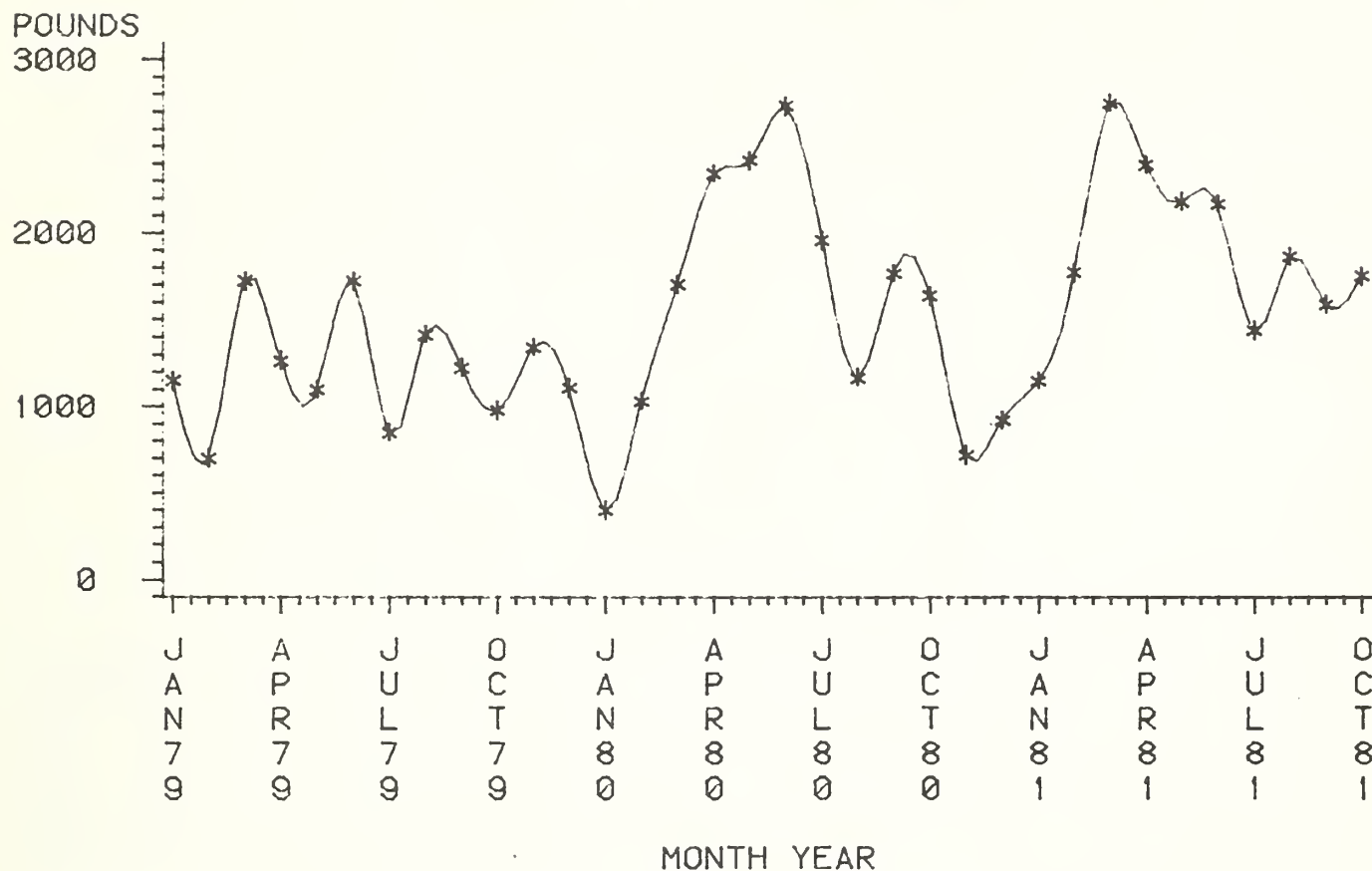


* IMPORT DATA IS IN THOUSANDS OF POUNDS .
SOURCE: INTERNATIONAL TRADE COMMISSION

Figure 9.--Canned mushroom imports from South Korea

CANNED MUSHROOM IMPORTS FROM HONG KONG

JANUARY 1979 TO OCTOBER 1981

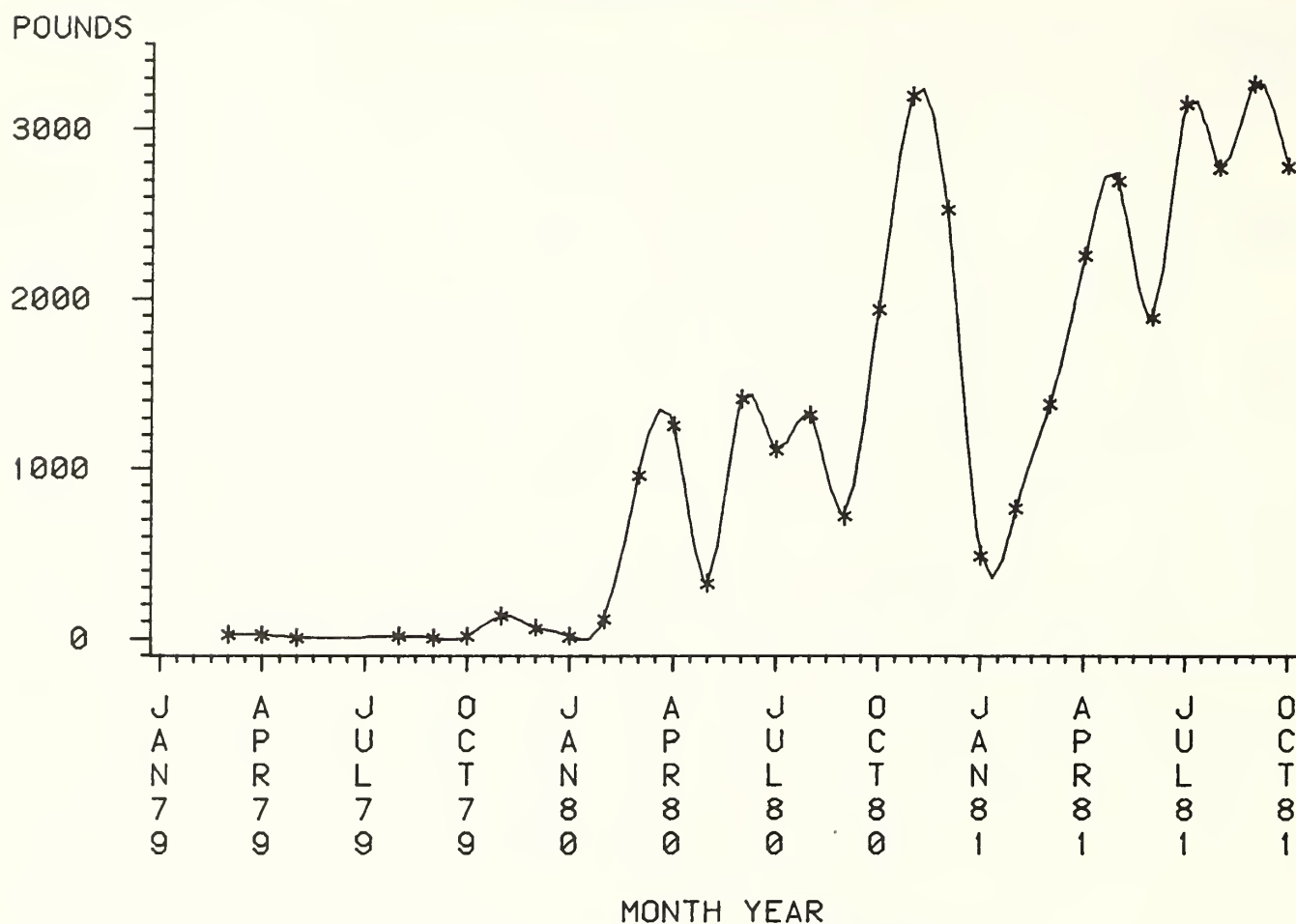


* IMPORT DATA IS IN THOUSANDS OF POUNDS
SOURCE: INTERNATIONAL TRADE COMMISSION

Figure 10.--Canned mushroom imports from Hong Kong

CANNED MUSHROOM IMPORTS FROM CHINA

JANUARY 1979 TO OCTOBER 1981



* IMPORT DATA IS IN THOUSANDS OF POUNDS
SOURCE: INTERNATIONAL TRADE COMMISSION

Figure 11.--Canned mushroom imports from China

THE MUSHROOM
INDUSTRY SURVEYScope of the Study

While some mushrooms are produced in several parts of the country, major U.S. production is concentrated in three areas--Pennsylvania, California, and Michigan. The USITC reported a total of 550 mushroom growers nationwide, with approximately two-thirds located in the Kennett Square/Temple area of Pennsylvania. Other sources indicated a total of 30 growers in California and another relatively heavy concentration of growers in Michigan.

Mushroom production and marketing operations in the Kennett Square/Temple area of Pennsylvania should provide an indication of the types of problems facing the U.S. domestic mushroom industry. A preliminary analysis indicated that the major group of growers adversely impacted by imports was the small to moderately sized firms in the Kennett Square/Temple area of Pennsylvania. These Pennsylvania growers, who have traditionally produced processing mushrooms, were experiencing low prices and were also at least partially responsible for disorderly marketing conditions resulting from their efforts to penetrate the fresh market.

The significance of the Pennsylvania mushroom producers provided justification for a decision to concentrate on this segment of the industry because of their numbers, relatively high concentration, importance as suppliers of processed mushrooms, and geographic location adjacent to the major fresh mushroom markets of the Northeast corridor. The relatively high concentration of processing firms and repackers in the same area provided additional support.

This inherent geographic bias was somewhat tempered by an extension of the study area to include selected areas and firms in Michigan and California. Data extracted from interviews with these production firms were more limited in scope than that obtained from interviews with firms in the Pennsylvania area.

Growers

A list of mushroom growers in the Kennett Square/Temple area of Pennsylvania, including growers in adjacent counties of Maryland, Delaware, and New Jersey, was developed from information supplied by the American Mushroom Institute, county Extension Service, and industry sources. In some instances, the list contained an indication of the size of the individual growing operation in terms of the number of doubles, or alternatively the number of square feet of growing

area. 6/ In all other cases, phone calls were made to growers to obtain this size information.

The master list contained 425 growers' names, current location, and size of operation. This list was stratified into four size groups and a sample was selected to reflect the makeup of the 425-firm universe. The sample size of 100 schedules was appropriate for reasonable representation and efficiency in terms of time and resources available for the study.

A separate master list of growers--26 from California and 10 from Michigan--was obtained from industry sources. No effort was made to develop a statistical sample of these growers in view of resource and time limitations that precluded a detailed examination. The highest concentration of California growers is found in the Watsonville/Salinas area. Michigan growers are concentrated in the Detroit area. Six firms in each area, arbitrarily selected and contacted by a personal visit, were asked to complete a limited schedule on current operations and marketing practices.

Preliminary calculations based on fragmentary data indicated that the U.S. domestic market for fresh mushrooms was dominated by five firms: Butler County Farms, Campbell Soup Company, Castle and Cooke, Monterey Mushrooms, Inc., and Ralston Purina Company. These firms were contacted for information on sales, production, and related data. Growing and sales operation of Castle and Cooke and Monterey Mushrooms are principally confined to the west coast; Ralston Purina and Campbell Soup have multiple production and sales outlets nationally and Butler County essentially operates from a single location in western Pennsylvania.

Repackers

Industry sources indicated from 17 to 22 repackers were servicing the industry in the Kennett Square/Temple area. 7/ Names and addresses and approximate volumes handled were obtained for 14 firms. These firms were stratified into three groups according to size (volume handled) and a statistical sample consisting of nine firms was selected from the three strata.

6/ The basic and traditional mushroom producing unit, a double, is a concrete block building 38 by 60 feet. It contains, on the average, 8,000 square feet of growing area.

7/ Repackers purchase bulk mushrooms from growers and sort and repackage in retail-size containers for subsequent resale to wholesalers and other distributors.

Canners

Eighteen of the 23 U.S. mushroom processing firms listed by USITC responded to the ITC questionnaire. Names and locations were secured on 15 canners currently operating mushroom canning facilities. Industry sources indicated that 10 of the canners on the list were among the largest volume firms in the industry in 1980. The remaining five canners were relatively smaller and located in the Kennett Square/Temple area of Pennsylvania. Among the 10 larger firms, 5 were located in the Kennett Square/Temple area, and 5 in other Eastern and Midwestern States. Data on processing operations and marketing practices were secured from 9 of the 15 firms.

Fresh Market Buyers

Fresh mushroom buyers consist mainly of chainstore buyers and wholesalers. Chainstore buyers buy on behalf of corporate chain retail stores and function through multiproduct produce warehouses operated by the chain. Wholesalers, generally multiproduct firms, buy fresh produce, including mushrooms, for resale to independent retailers, institutional buyers, or retail chains whose volume is insufficient to support a captive wholesale produce operation.

A list of chainstore buyers for those firms operating in the major Northeast corridor markets of Boston, New York, Philadelphia, Baltimore, Washington, and Richmond was stratified on the basis of dollar-sales volume. The assumption that dollar sales were correlated with other variables in the study and that dollar sales would reflect the variations in the other study variables justified the stratification. A statistical sample was then drawn based on the assumed relationships.

Kinds of Data

The kinds of data sought in the industry survey differed depending on the type of entity being surveyed, that is, grower, repacker, canner, or buyer. Certain types of information sought were purely qualitative and specific to each entity to provide a basis for describing the major characteristics and/or range of activities of the particular subsector under consideration. Information on production and marketing practices, on pricing arrangements, and on grading are examples of qualitative data sought from the various subsectors. Other types of data were quantitative, such as production, raw stock purchases, sales volumes, prices, and in the case of the grower subsector, production costs. A strong effort was made to trace product flows (sales) and utilization among subsectors. The magnitude of the data collection task and the limited records kept by surveyed firms, particularly growers, required that the study period be limited to a single (most recent) calendar year. This procedure required a number of appropriate adjustments to achieve comparability in the case of other types of entities using a different fiscal year.

THE GROWER SECTOR

Table 3--Grower survey, strata definitions, expected and actual firms in each stratum

Stratum	Strata Definitions (Number of doubles)	Number of sample schedules	
		Expected	Actual
1	Greater than zero but less than 5	49	33
2	5 or greater but less than 13	36	48
3	13 or greater but less than 21	9	9
4	21 or above	6	6
Total		100	96

THE GROWER SECTOR

Scope of the Survey The initial stratified sample selection process envisaged a sample size of 100 growing firms spread over 4 size strata in proportion to their representation in the sampling universe of 425 firms. Firm size in the case of bed plants was based on the number of doubles controlled by the firm, either owned or leased, and in the case of tray plants by the one-time capacity of the plant in square feet. ^{8/} The sample size, strata definitions, and number of firms in each strata are summarized in table 3.

A total of 96 usable schedules was obtained from personal interviews with owners and/or managers of mushroom growing firms. The number of firms in each size stratum differed from the proposed sample design due to changes in firm size discovered in the course of the survey. The major change between the proposed sampling distribution and the actual distribution occurred between strata 1 and 2. The initial sample selection called for 49 firms in stratum 1. A number of firms selected for stratum 1 were found to have increased in size such that they fell in stratum 2. The number of firms selected for stratum 1 fell from 49 to 33 and the number of firms in stratum 2 increased from 36 to 48 firms. Four schedules in stratum 1 were discarded for reasons of severe data deficiencies.

Production Total annual mushroom production for a given firm is a function of the number of square feet of growing area, the

^{8/} See description of mushroom production process, appendix B.

Table 4--Number of growers sampled, number of growers with sales and cost data, mean size of operation, number of fills, actual and estimated yields, 1980

Stratum :	Number of growers		: Mean size of	: Annual	:	Mean yield	
:	Sampled:	With sales,	: operation	: Fills	:	Estimated	: Actual
:	:	: cost data :	: Square Feet	: Number	:	:	:
:	:	:	:	:	:	<u>Pounds per sq. ft.</u>	
:	:	:	:	:	:	:	:
1	33	22	23,038	2.40	:	2.46	2.21
2	48	21	62,523	2.50	:	2.94	2.84
3	9	7	131,645	2.70	:	3.46	3.17
4	6	4	256,848	3.30	:	3.00	2.15
All growers, total	96	54	--	--	:	--	--
All growers, mean	--	--	67,575	2.56	:	2.80	2.57

-- = Not Applicable

number of fills, and the yield measured in pounds per square foot. Each of the sample firms were asked to estimate their yield and the number of square feet filled in the 1980 calendar year. These data are summarized for each strata and for all firms in table 4.

Usable sales and cost data were obtained from 54 of the 96 growers in the sample. The number of firms in each stratum for which sales and cost data were obtained is shown in table 4. Estimated yields in pounds per square foot were calculated as a simple average of the yields reported by each grower in a given stratum. Actual yields for each grower in each stratum were calculated by dividing total sales in pounds for each grower by the product of the number of fills and the square feet of planting area to arrive at an actual yield for the grower. Mean actual yields for each stratum are a simple average of the actual yields for each grower in the stratum.

The sample data indicate that all growers overestimated actual yields. The difference between estimated yields, 2.80 pounds per square foot, and actual yields, 2.57 pounds per square foot, for all growers was significant at the 5- percent level.

Table 5--Total and average number of doubles filled by strata and for 96 sample firms, 1980

Stratum	Number of firms	Total doubles filled	Average doubles filled per firm
1	33	236	7.1
2	48	1,011	21.0
3	9	412	46.0
4	6	582	97.0
All growers	96	2,241	23.3

Plant Operations

All of the sample firms were bed-type operations. The 96 sample firms filled an average of 23.3 doubles per firm or a total of 2,241 doubles in the calendar year 1980, as shown in table 5. Stratum 1 firms filled a total of 236 doubles or an average of 7.1 doubles for the 33 firms in the strata. Stratum 2 firms filled a total of 1,011 doubles or slightly less than half of the total number of doubles filled by all firms, for an average of 21 doubles per firm. Stratum 3 firms filled an average of twice as many as all growers with 46 doubles filled per firm. Stratum 4 firms filled an average of 97 doubles per firm or a total of 582 doubles, resulting in the highest fill rate, 3.3 fills per double, among all firms in the sample.

A growing cycle is the period when a mushroom house is filled, until it is emptied, cleaned, and readied for the next fill, or a measure of the period in which the production facility is in use in the production of a given crop. Relatively short period cycles are somewhat indicative of production intensity. A cycle may be shortened because of factors, such as disease, that impact on quality or productivity, or because of economics (that is, the expected revenue from the remaining production is insufficient to cover expected costs).

Normally, a cycle will range from 80 to 100 days, with the termination point determined by the number of "flushes" that the grower chooses to pick. The first flush appears approximately 50 days after filling, with subsequent flushes following at 10-day intervals. It has been estimated that 80 percent of the production in a given fill is obtained in the first three flushes.

The mean cycle length for 96 respondent growers was 102 days and the median cycle length was 100 days (table 6). Stratum 1 growers reported a mean cycle length of 113 days, the longest

growing cycle among firms in all strata. Firms in this same stratum average 6.3 flushes per cycle with a median of 6 flushes per cycle. Respondents in strata 2 and 3 reported an average of 97 days per cycle and slightly more than 5 flushes per cycle. Stratum 4 firms reported the shortest cycle and the smallest number of flushes per cycle (mean number of flushes, 4.8) among firms in all strata. The data tend to confirm the stronger economic orientation of larger firms in minimizing downtime and increasing the output of a given facility.

Thirty-two percent of the respondents (30 firms) indicated that decisions to end a production cycle are predicated on maintaining a planned production schedule. Other reasons given were low production, 35 percent; disease, 18 percent; cost of harvesting, 9 percent; and quality deterioration, 6 percent. The maintenance of a planned production schedule by the respondent firms is an indication of a strong fresh market orientation.

The development and adoption of refrigerated air control technology has enabled growers to expand production through additional fills during the summer months. It has also facilitated more precise control of the growing process by providing a means for adjusting to the more extreme changes in the external environment. Air control technology used by mushroom growers consists of two types: simple mechanical air-conditioners, either portable or fixed, and high capacity air-moving equipment, air movers with both heating and cooling ability. For purposes of analysis, firms without mechanical air-conditioning equipment were classified as having low technology; with air-conditioners, moderate technology; and with air movers, high technology.

Table 6--Average and median number of days in the growing cycle, and average and median number of flushes per cycle, 96 growing firms, by strata, calendar year 1980

Stratum	:	Length of cycle		:	Number of flushes	
		Mean	Median		Mean	Median
	:	<u>Days</u>		:	<u>Number</u>	
1	:	113	110	:	6.3	6
2	:	97	98	:	5.2	5
3	:	97	93	:	5.3	5
4	:	94	91	:	4.8	5
All firms	:	102	100	:	5.6	5

Ninety percent of the respondents (86 firms) indicated that they used some form of mechanical air-conditioning system. Seventy-three percent (70 firms) of the respondents described their air control systems as air-conditioners and 17 percent (16 firms) as air movers. Ten percent (10 firms) reported using only nonmechanical ventilators and circulating fans.

Seventeen percent of the respondents (16 firms) indicated that automatic air-monitoring systems were used in conjunction with air control systems. Complete production and sales data were obtained from nine of these respondent firms. Mean yields for the 9 firms with automatic monitoring systems were greater than mean yields for the 56 firms for whom comparable data were available but who did not utilize automatic monitoring systems. This difference was statistically significant at the 5-percent level.

The single proprietorship (52 percent) was the most common form of business organization for all of the sample firms (table 7). Among strata 1 and 2 firms, 82 and 48 percent, respectively, had this form of business organization. The partnership form of organization was about equally important in strata 1, 2, and 3. All of the stratum 4 firms and 67 percent of the stratum 3 firms were corporations. In all but one situation, the corporate firms were family or closed-type corporations with one to five stockholders.

Table 7--Selected characteristics of mushroom producing firms, 96 sample firms, calendar year 1980

Characteristic	:	:	Strata								
			All firms	:	1	2	:	3	:	4	
	:	:	-----Percent-----								
Type of organization	:	:									
Single proprietorship	:	:	53	:	82	:	48	:	11	:	0
Partnership	:	:	21	:	18	:	25	:	22	:	0
Corporation	:	:	26	:	0	:	27	:	67	:	100
	:	:	-----Years-----								
Average number of years as present firm type:	:	:									
Single proprietorship	:	:	14.0								
Partnership	:	:	32.5								
Corportation	:	:	21.0								
	:	:	-----Percent-----								
Percentage of total income from mushroom production---	:	:	96	:	94	:	95	:	97	:	100

All of the sample firms had a relatively extensive history in their present organizational form, with single proprietorships indicating an average of 14 years, partnerships 21.5 years, and corporations 21 years of organizational life.

Number of Plants

A mushroom plant, for purposes of the study, is defined as any production facility at a specific location. The average number of plants operated by respondent firms in each stratum is shown in table 8. Larger firms, strata 3 and 4, with 2.9 and 3.5 plants per firm, respectively, operated more plants than smaller ones. The average number of plants across all strata was 1.7 plants per respondent firm. Twenty-nine respondent firms indicated that they rented some part of their operational growing area. The total rented area was estimated at 1,164,000 square feet or 16 percent of the total growing area represented by the sample plants.

The sample firms operated a total of 804 doubles, of which 84 percent were owned by the operator, 14 percent cash-leased, and 2 percent share-leased (table 8). Stratum 2 firms controlled the largest number of doubles among all strata in the sample, 77 percent of which were owned, 19 percent were cash-leased, and 4 percent were share-leased. Stratum 2 operated 395 doubles or approximately 49 percent of all doubles operated by the 96 sample firms. Firms in strata 3 and 4 each operated 19 percent of all doubles in the sample.

Financing

Production credit is generally considered the lifeblood of agriculture, whether it be formalized institutional loans or informal credit arrangements with input suppliers. The sample firms were queried as to the amount of outstanding production credit of the formal type and the source of this credit. Forty-five firms, 47 percent of all firms, indicated outstanding production credit loans for a total of \$2,065,099 and a mean loan value of \$45,891 (table 9). Fifteen small firms, or 45 percent of the stratum 1 firms, indicated use of production credit. The average loan in stratum 1 was small, however, amounting to slightly over \$16,000 per firm. Over 50 percent of stratum 2 firms had outstanding production credit loans, with a mean value of \$45,985 per firm.

No effort was made in the survey to measure growers' use of credit, including supplier credit, due to the generally sensitive nature of such information, for example, accounts payable. There is considerable reason to believe that the outstanding indebtedness of many growers is relatively large. For example, one compost supplier, producing compost for approximately 1,200 doubles annually, indicated accounts receivable in excess of \$1 million.

Table 8--Number and percentage of doubles owned, cash-leased, and share-leased, for all sample firms, by stratum, calendar year 1980

Stratum	Average number of plants per firm	Doubles									
		Owned					Leased				
		Number	Cash-leased	Share-leased	Total	Owned	Cash-leased	Share-leased	Doubles operated as percentage of all doubles in the sample	Percent	Percent
1	1.1	88	13	1	102	86	13	1	13	13	
2	1.6	303	77	15	395	77	19	4	49	49	
3	2.9	129	25	--	154	84	16	--	19	19	
4	3.5	149	3	1	153	97	2	1	19	19	
All growers	1.7	669	118	17	804	84	14	2	100	100	

Table 9--Use of production credit, outstanding credit, and mean loan amount for all growers, by strata, calendar year 1980

Stratum	Total firms	Sample firms using credit	Total credit	Outstanding credit	Average loan
	Number	Number Percent	Dollars	Percent	Dollars
1	33	15 45	245,459	11.9	16,363
2	48	25 52	1,149,640	55.6	45,985
3	9	3 33	425,000	20.6	141,666
4	6	2 33	245,000	11.9	122,500
All growers, total	96	45 --	2,065,099	100.0	--
All growers, mean	--	-- 47	--	--	45,891

-- = Not Applicable

Growers used commercial banks and the Production Credit Associations (PCA's) about equally as a source of production credit loans. Although slightly more of the grower firms obtained loans from commercial banks, the average amount of loan was greater from the PCA's (table 10).

Farmers Home Administration accounted for 8 percent of all loans and approximately 6 percent of total loan funds. The mean loan amount, \$30,000, was the smallest among all credit sources. Approximately 11 percent of production credit loans were unspecified as to source. These loans, probably from family or individuals, amounted to 14 percent of total production credit loan funds and averaged almost \$60,000 per loan.

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Table 10--Production credit sources, number of firms utilizing each source, mean loan value by source, and total loans by source, for 45 firms, by strata, calendar year 1980

Sources of credit	: Number : of : firms	: Mean : loan amount : Dollars	: Total loans : Dollars
Production Credit Associations	: 16	45,490	727,840
Commercial bank	: 19	37,971	721,462
PCA and commercial bank <u>1/</u>	: 1	200,000	200,000
Farmers Home Administration	: 4	30,000	120,000
Other (unspecified)	: 5	59,159	295,797
All sources, total	: 45	--	2,065,099
All sources, mean	--	45,891	--

-- = Not Applicable

1/ The respondent firm did not allocate the loan between the two sources.

Mushroom Production Costs

The stability of the mushroom growing sector, in the short run, depends on its ability to cover variable production costs. In the longer run, a firm must also recover its fixed costs, which include a normal return on investment. A preliminary analysis of the growing process indicated that variable costs, including a return for owners' management and labor, were of primary importance for most growers. Mushroom growing is an intensive agricultural production process requiring relatively little land area as compared to other agricultural production processes. Mushroom houses (doubles) constitute irretrievable costs since there are no practical alternative uses for these facilities. Although depreciated to zero for tax purposes, many installations are currently fully utilized as producing units. Houses are seldom completely demolished and replaced, but are often partially rebuilt and refurbished. Expenditures for these extensive repair operations should be capitalized and depreciated. Since repair and refurbishment of the existing plant is a continuous process, most growers appear to treat this cost item as an annual expense. Furthermore, normal repairs are often performed by the operator, and plant labor and labor costs are not explicitly identified. The survey data indicated that, for most growing operations, costs attributed to undepreciated plants and equipment were a minor or nonexistent item.

Fixed costs associated with ownership are generally restricted to depreciation, repair and maintenance, taxes, and insurance. In some instances interest on undepreciated investment is added, either because it is represented by outstanding indebtedness or it is imputed at market rates to determine a return on the operator's investment. The grower survey generated only a minimal amount of ownership cost data, restricted in most instances to annual property insurance and tax payments.

The cost portion of the survey focused on the development of variable production costs. These costs, taken from growers' records, were summarized under five headings: direct production inputs, fuel, electricity, packaging, and labor costs.

Direct production inputs included all purchased items such as compost, spawn, manure, casing soil, insecticides, and other miscellaneous inputs. Fuel included fuel for heating houses and other hydrocarbon fuels for operating plant equipment and vehicles. Electricity costs were based on metered charges for electricity for the calendar year. Not all firms in each stratum incurred packaging costs, since many producers, particularly the larger ones, sell all output to repackers or other bulk handlers.^{9/} Packaging costs thus represent average costs of packaging materials only for growers selling some portion of their output in retail containers.

Labor costs were based primarily on each firm's gross labor payroll. These costs were adjusted subsequently to include a uniform allowance for housing when supplied by the grower. (Fifty-eight of the 60 firms responding indicated that their firms provided employee housing.) Contract labor costs for filling, cleaning, steaming, spawning, and casing operations were added to gross labor payrolls, where appropriate, to arrive at a total adjusted labor cost for the growing operation. This adjustment served to blunt the distinction between those firms which maintained a labor force to perform these enumerated functions and those plants which contracted for their performance.

Approximately 71 percent of the sample firms purchased compost from specialized compost suppliers, with the remaining firms producing their own compost (table 11). Those firms processing their own compost must necessarily use more labor

^{9/} "Stratum" refers to the categories of firm size, defined in table 3 on the basis of number of doubles per grower.

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Table 11--Number and percent of firms processing and purchasing compost, for all firms, by strata, calendar year 1980

Stratum		Purchase Compost			Process Compost	
		Number	Percent		Number	Percent
1	:	29	86	:	4	14
2	:	32	67	:	16	33
3	:	4	45	:	5	55
4	:	<u>3</u>	50	:	<u>3</u>	50
All growers	:	68	71	:	28	29

and have higher labor costs, other things being equal, than firms purchasing compost. Conceivably, some of the composting labor may be obtained by more efficient use of existing labor. The decision to process or purchase compost depends on a combination of the relative costs of compost from either source and subjective grower preferences. Total variable costs per pound of mushrooms or per square foot were not demonstrably affected by the decision to purchase or process compost.

No allowance was made for a cost for the operator-owner's management or labor, based primarily on the wide variation in management payments among firms in the various size groups covered by the survey. There were also indications from some growers that the magnitude of the payment (cost) was a function of funds available after other costs were paid. The return to management can be considered a fixed cost for a given unit of management and, therefore, not properly includable in variable production costs.

Variable Cost Per Pound

Costs per pound of mushrooms produced were computed for each stratum and for all firms in the 54 firm sample for which complete sales data (actual production data) and cost data were available. Average and median variable costs for the 54 sample firms amounted to \$0.570 and \$0.526, respectively (tables 12 and 13). Twenty-five percent of the firms had costs of less than \$0.462 per pound, while another 25 percent experienced costs in excess of \$0.662 per pound.

Table 12--Mean variable costs per pound, 54 sample firms, by major cost components, for all sample firms, by strata, calendar year 1980

Stratum:	Firms	Direct : :prod	:	:	:	:
:	:	inputs	:	:	:	:
	Number	Dollars				
1	22	.283	.048	.032	.206	.569
2	21	.256	.038	.039	.202	.535
3	7	.190	.079	.041	.266	.576
4	4	.197	.048	.030	.333	.608
All growers	54	.224	.052	.035	.259	.570

Table 13--Median variable cost per pound, 54 sample firms, by major cost components, for all sample firms, by strata, calendar year 1980

Stratum:	Firms	Direct : :production	Fuel	Electricity	Labor	Total <u>1/</u>
:	:	inputs	:	:	:	:
	Number	Dollars				
1	22	.249	.046	.026	.211	.559
2	21	.211	.036	.026	.200	.468
3	7	.163	.063	.044	.316	.551
4	4	.204	.050	.030	.308	.579
All growers	54	.229	.040	.026	.219	.526

1/ The total of the medians is not necessarily equal to the median of the totals within strata and for all growers due to variations among the ranges in component costs.

Complete cost and production data were available for 22 of the 38 firms in stratum 1 (less than 5 doubles). Average and median costs of production for these firms amounted to \$0.569 per pound and \$0.559 per pound, respectively. Twenty-five percent of the 22 firms experienced average variable costs of less than \$0.490 per pound and 25 percent had average variable costs greater than \$0.633. The range of costs in stratum 1 firms was \$0.335 to \$0.753 per pound, a difference of \$0.420 per pound.

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Cost and sales data were available for 21 firms in stratum 2 (5 to 13 doubles). Average variable costs for these firms amounted to \$0.535 per pound. The median variable cost figure amounted to \$0.468 per pound. Twenty-five percent of these firms experienced variable costs less than \$0.426 per pound and 25 percent had costs greater than \$0.729 per pound. The range of costs in these firms was from \$0.232 to \$1.158 per pound, a difference of \$0.926 per pound.

The survey yielded complete cost and sales data for seven of the nine firms in stratum 3 (13 to 21 doubles). The average and median variable costs per pound for these firms amounted to \$0.576 and \$0.551, respectively. The lowest computed average variable cost per pound was \$0.364 and the highest was \$1.12, a difference of \$0.757 per pound.

Complete cost and sales data were obtained from four of the six firms in stratum 4 (more than 21 doubles). Average variable costs for the four firms amounted to \$0.608 per pound. The median variable cost per pound amounted to \$0.579. With data from only four firms in this stratum, the influence of higher costs in only one of the four firms becomes significant. Average variable costs for each of the sample firms were \$0.488, \$0.490, \$0.667, and \$0.697 per pound. Two of the sample firms in this stratum thus experienced reasonably low costs, when compared to average variable costs for all 56 firms (\$0.570 per pound), and 2 firms exceeded the 56-firm average variable cost.

Variable Costs Per Square Foot

Cost per square foot is a function of the number of square feet of a firm's growing area, the average variable cost per fill, and the number of fills over the accounting period. Theoretically, if these variable costs are properly allocated they should be more stable and representative of variable costs actually incurred by different sizes of plants since they are little affected by changes in yield. The yield variable is subject to wide variations among plants of the same size due to crop failure resulting from disease, insect infestation, and other factors. This is particularly true when the basic data are derived from a single short term accounting period.

Costs per square foot developed in this study diverge somewhat from the conceptual norm due to an inability to segregate labor associated with yields (picking labor and packaging labor) from other labor cost categories. Average and median variable costs per square foot are shown in tables 14 and 15, respectively.

Table 14--Mean variable cost per square foot of capacity, 54 sample firms, by major cost component, by strata, calendar year 1980

		: Direct	:	:	:	:	:
		:production	:	:	:	:	:
Stratum:	Firms	: inputs	: Fuel	: Electricity	: Labor	:	Total
	Number	-----Dollars-----					
1	22	.600	.103	.066	.462		1.231
2	21	.654	.100	.090	.562		1.406
3	7	.622	.206	.143	.893		1.864
4	<u>4</u>	.399	.105	.070	.662		1.236
All growers	54	.560	.128	.094	.664		1.446

Table 15--Median variable cost per square foot of capacity, 54 sample firms, by major cost components, by strata, calendar year 1980

		: Direct	:	:	:	:	:
		:production	:	:	:	:	:
Stratum	Firms	: inputs	: Fuel	: Electricity	: Labor	:	Total 1/
	Number	-----Dollars-----					
1	22	.613	.112	.062	.383		1.332
2	21	.635	.093	.072	.544		1.353
3	7	.584	.163	.145	.688		1.550
4	<u>4</u>	.427	.124	.069	.645		1.241
All growers	54	.613	.111	.066	.550		1.358

1/ The totals of the medians are not necessarily equal to the median of the totals within strata and for all growers due to variations among the ranges in component costs.

Ownership Costs

Survey data on ownership costs, particularly depreciation on plant and equipment, were relatively incomplete. The data indicated rather extreme variations among strata and among firms within strata. These variations were to be expected because of differences in age of plant and in original costs.

A set of ownership costs was developed for the sample firms based on current 1980 replacement costs of a mushroom plant. Construction costs were estimated to range between \$60,000 and

\$80,000 per double with at least some part of this range due to the amount of technical sophistication incorporated in the heating and air-control systems. The lower end of this range, \$60,000 per double, was selected as more representative of existing plants.

Land for the mushroom plant was priced at \$2,500 an acre. Land requirements were assumed to vary disproportionately with the number of doubles in the plant; that is, larger plants require more land area per double than smaller plants.

Ownership costs were computed in terms of initial investment in facilities per year: depreciation, 5 percent; repair and maintenance, 3 percent; insurance, 3 percent; and taxes, 0.5 percent. Interest was computed at 10 percent of the average investment in land and facilities. The magnitude of the costs developed is probably reasonably representative of those which would be encountered by existing plants if they were to come on stream in 1980. These costs are summarized in table 16.

Annual costs are relatively conservative, amounting to approximately 16 percent of investment in each instance. They could conceivably range as high as 25 percent of investment in a given case. The level of these costs on a per pound basis reflects the actual yield and average number of fills by the sample firms in each of the strata. Potential investors facing annual ownership costs of these magnitudes would necessarily need some assurance that actual output (a function of yield and the number of fills) would exceed the average of existing

Table 16--Annual ownership costs, ownership costs per square foot, and average ownership costs per pound, by strata, calendar year 1980

Stratum	: :	Approximate annual ownership costs 1/	Average cost per sq. ft. <u>Dollars</u>	Weighted average cost per lb.
1		31,175	1.30	0.26
2		80,025	1.25	0.19
3		170,925	1.25	0.16
4		326,400	1.27	0.19

1/ Annual costs are based on firms with 3, 8, 17, and 32 doubles.

firms. Few, if any, existing firms will experience current ownership costs of these magnitudes since much of the existing plant and equipment has been totally depreciated.

Cost and Revenues

Average variable cost per pound for the 54 sample firms was charted against their annual mushroom sales (figure 12). The number assigned to each grower indicates the size stratum for the firm. Lines on the chart drawn parallel to the base indicate the annual weighted average price for all mushrooms. The lower line indicates the Pennsylvania price; the higher line, the national price.

Figure 12 indicates that four of the stratum 1 firms, five of the stratum 2 firms, two of the stratum 3 firms, and one stratum 4 firm have variable costs in excess of the weighted average Pennsylvania price. One stratum 3 firm and one stratum 4 firm had achieved a break-even position with respect to the weighted average price. Although informative, this analysis does not necessarily mean these firms are experiencing losses. Conceivably, they could be selling a greater part of their output in the fresh market at prices higher than the weighted average price.

Figure 12 illustrates the wide range in costs and output reported by the sample firms. A firm's assignment to a given stratum is determined by its production potential in terms of production area. A firm's position on the chart is based upon management's ability to produce mushrooms in a plant of a specified size. In many cases, small plants (in terms of area) reported larger outputs than larger plants. They may also have experienced lower costs. Two stratum 2 plants indicated lower costs than any other plant. The extremely low costs noted in this instance may be due to widespread use of owner and unpaid family labor, which were excluded from the cost computations.

Figure 13 contains the same data as figure 12 with the addition of estimated ownership costs developed in the study. This figure illustrates the probable average cost-average revenue position of the sample firms if ownership costs must be covered at these output levels. The calculated ownership costs represent estimated costs at current (1980) price levels, and they will be considerably higher than those experienced by existing plants, since most of them will have earlier and lower investment costs. The ownership cost elements reflect the effect of larger volumes resulting in lower average costs because of more intensive use of a given plant facility. This latter effect is particularly noticeable for stratum 3 plants with high volume potential but low output.

Table 17--Market orientation, fresh and processed markets, by strata, for 95 mushroom growing operations, calendar year 1980

Stratum	Fresh market		Processed market		Both markets	
	Number	Percent	Number	Percent	Number	Percent
1	21	64	8	24	4	12
2	24	51	15	32	8	17
3	5	56	3	33	1	11
4	3	50	3	50	--	--
All growers	53	56	29	30	13	14

-- = Not Applicable

The average cost-average revenue relationship of the firms in figure 13 is not representative for a firm selling mainly in the higher price fresh market. This would raise the level of the average revenue lines, indicating profitability for more of the sample firms.

Marketing by Growers

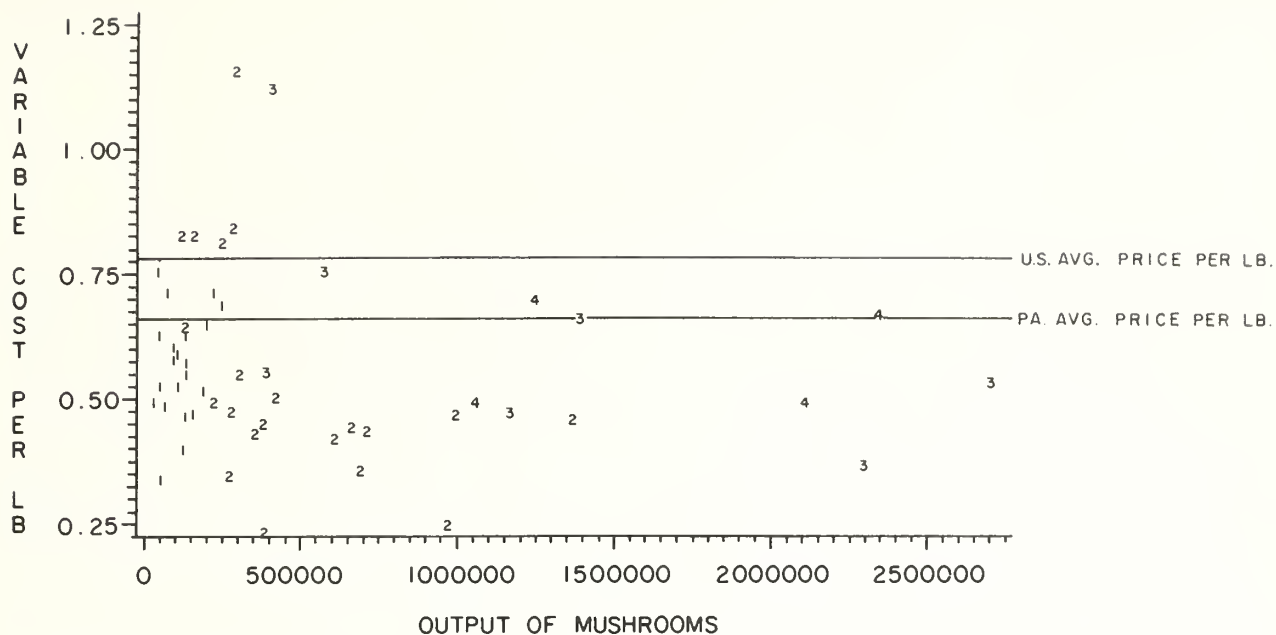
Market Orientation

Growers were asked to specify whether their operations were oriented toward fresh or processed markets. Fifty-three firms (56 percent) responded that they were fresh-market oriented, 29 firms (30 percent) processed-market oriented, and 13 firms (14 percent) oriented toward both markets (table 17).

Sixty-four percent of the stratum 1 firms indicated a fresh market orientation, the largest percentage among all strata. The specific fresh market orientation among all firms was as clear, ranging from 50 to 64 percent.

Varietal Differences

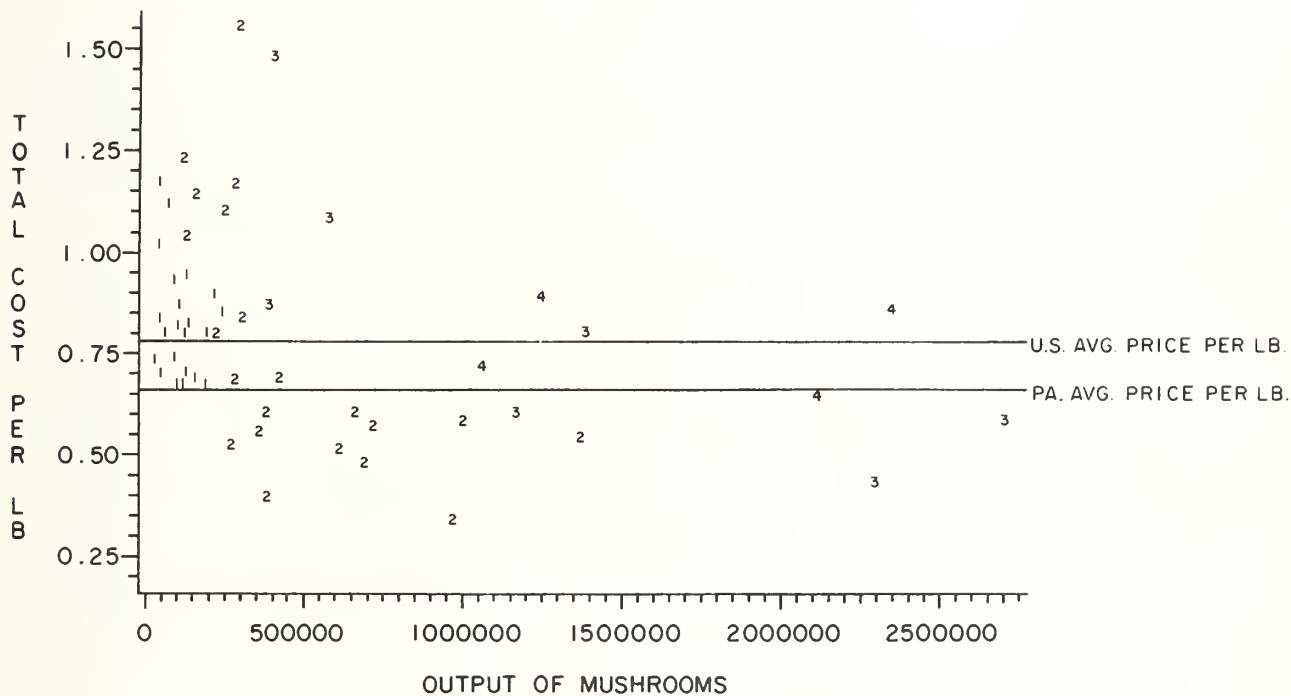
Fresh mushroom markets in the Eastern United States demand either white or off-white mushrooms. A determination of the varietal production mix of firms in the various strata may indicate their relative ability to supply the fresh market. Actual production of fresh market varieties should also correlate with the sample firms' market orientation. The varietal mix exhibited by the sample firms would not necessarily be stable. Many growers prefer to grow creme varieties which are said to be less difficult to grow than either white or off-white varieties. When the difference between fresh market prices and processed market prices narrows, resulting in a reduction in the fresh market premium, a shift from the production of white and off-white varieties might be expected, in line with expressed growing preferences.



LEGEND: STRATA 1 1 1 1 2 2 2 2 3 3 3 3 4 4 4 4

SOURCE : 1980 GROWERS SURVEY

Figure 12.--Cost per pound data: Variable cost per pound



LEGEND: STRATA 1 1 1 1 2 2 2 2 3 3 3 3 4 4 4 4

SOURCE : 1980 GROWERS SURVEY

Figure 13.--Cost per pound data: Total cost per pound

Varietal production for 96 sample firms, by strata, is summarized in table 18. These data indicate that production of white and off-white varieties amounted to approximately 13.8 million and 11.8 million pounds, respectively, or 79 percent of total production by the sample firms. Firms in strata 1, 2, and 3 indicated that approximately 80 percent of their total production was accounted for by the white and off-white varieties. Stratum 4 firms devoted a smaller percent of their production to the white and off-white varieties, 70.2 percent, and in general indicated a relatively even distribution among whites, off-whites, and cremes. Stratum 1 firms were the only firms indicating production of the brown variety which, at least in eastern U.S. markets, is sold solely for processing.

The production of white or off-white mushrooms does not guarantee that they will meet fresh market standards. Other qualitative factors are almost as important. The relatively high proportion of total production devoted to these fresh market varieties does, however, support the market orientation perceptions of the sample firms (table 17).

Market Sales and Sales Outlets

Many growers are directly involved in marketing, selling at least some part of their output in retail containers. Thirty-eight percent of all growers surveyed indicated that at least some part of their output was sold in retail containers. The bulk of these sales is in 3-pound baskets, the primary retail package utilized by growers. Approximately 6.9 million pounds, or 21 percent of total sales by the sample firms, were marketed in these containers. Sales in 3-pound baskets are not, however, restricted to direct sales by growers.

The greater portion of growers' production is sold through market intermediaries such as repackers, wholesaler-distributors, netmen, and commission merchants. These are essentially fresh market sales outlets. Traditionally, many growers produced for and sold directly to canners and other processors. Although some growers still produce specifically for these markets, many growers consider canners and other processors as a residual market, an outlet for low quality mushrooms, culls, and prime mushrooms which are surplus to fresh market requirements. Bulk sellers and repackers are the sole market intermediaries supplying the processed mushroom market on a regular basis.

The respondent firms were asked to estimate the disposition of their production by market outlet. Market sales estimates were obtained from 63 of the sample firms and are summarized in table 19. These firms sold approximately 32.3 million pounds of mushrooms in 1980. Canners, repackers, and wholesaler-distributors constituted the major outlets, accounting for

Table 18--Varieties grown, pounds produced, and varietal production as a percentage of total production, for 96 firms, by strata, calendar year 1980

Stratum	Firms Number	Whites		Off-Whites		Cremes		Browns		Total Pounds
		Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	
1	33	1,538,110	55.2	724,318	26.0	248,872	8.9	276,603	9.9	2,787,903
2	48	6,627,316	47.6	4,835,473	34.7	2,465,832	17.7	--	--	13,928,621
3	9	3,361,296	37.6	3,771,291	42.1	1,814,638	20.3	--	--	8,947,225
4	6	2,300,317	34.0	2,446,890	36.2	2,015,744	29.8	--	--	6,762,951
All growers	96	13,827,039	42.6	11,777,972	36.3	6,545,086	20.2	276,603	0.9	32,426,700

-- = Not Applicable

31.5, 32.6, and 19.3 percent of total sales, respectively, or 83.4 percent of total sales.

The type of outlet may provide some clue as to the possible final use of the product, whether fresh or processed. Sales to netmen, commission merchants, chainstores, and retailers, approximating 3.3 million pounds or 10.3 percent of total sales, were undoubtedly destined for the fresh market. The same is true for wholesaler-distributors, having 6.2 million pounds or 19.3 percent of total sales. Sales to repackers, 10.5 million pounds, although essentially fresh market sales, may or may not have been utilized as fresh mushrooms.

The companion repacker survey indicated that 70 percent of total receipts by repacking firms were marketed fresh. On this basis, 7.4 million pounds sold by the 63 growers to repackers would ultimately have ended up in the fresh market. The outlet sales data, when allocated by apparent end use, indicate fresh market sales of 16.9 million pounds (52.5 percent of total receipts), processed market sales of 13.7 million (42.5 percent of total receipts), and sales for indeterminate use of 1.6 million pounds (5 percent of total receipts). These data are summarized in table 20 for all firms and by size strata.

The relatively low allocation to the fresh market by stratum 3 (moderately large firms) appears inconsistent. Firms of this size are generally considered fresh-market oriented. The market orientation data, table 17, indicate that 56 percent of the firms in this stratum indicated a fresh market orientation, 33 percent a processed market orientation, and 11 percent a mixed fresh and processed market orientation. Further examination of table 20 indicates that 12.3 percent of total sales by stratum 3 firms were allocated to the indeterminate market category. If 1.1 million pounds is allocated to the fresh market, fresh market sales by stratum 3 firms increase to 51 percent of total sales. This would be reasonably close to the allocation expected for stratum 3 firms.

Estimated fresh market sales by stratum 4 firms amounted to 64.8 percent of total sales by these firms. This figure is considerably higher than the average for all firms and also higher than might be expected from the market orientation data (table 17). The small number of firms in stratum 4 increases the probability of overestimating or underestimating any given parameter.

Table 19--Pounds sold and percentage of total sales of 63 sample firms, by sales outlets and strata, calendar year 1980

Outlets	Stratum 1		Stratum 2		Stratum 3		Stratum 4		All firms	
	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent
Canners	1,105,978	41.7	4,174,314	30.0	3,641,428	40.7	1,250,940	18.5	10,172,660	31.5
Repackers	659,252	24.9	5,385,479	38.7	2,462,020	27.5	2,009,752	29.7	10,516,503	32.6
Netmen	458,612	17.3	1,439,664	10.3	39,359	.4	632,462	9.4	2,570,097	8.0
Chainstores	109,266	4.1	113,857	.8	246,597	2.8	--	--	469,720	1.5
Commission merchants	181,139	6.8	10,232	.1	--	--	--	--	191,371	.6
Wholesaler-distributors	99,189	3.8	2,402,896	17.3	1,388,340	15.5	2,342,745	34.6	6,233,170	19.3
Retailers	37,512	1.4	--	--	70,169	.8	--	--	107,681	.3
Other processors	--	--	402,206	2.8	--	--	--	--	402,206	1.2
Other	--	--	--	--	1,099,312	12.3	527,052	9.4	1,626,363	5.0
Total	2,650,948	100.0	13,928,648	100.0	8,947,225	100.0	6,762,950	100.0	32,289,771	100.0

-- = Not Applicable

THE GROWER SECTOR

Table 20--Estimated sales to fresh and processed markets for 63 sample firms, by strata, calendar year 1980.

Stratum		Estimated fresh market		Estimated processed market		Indeterminate	
		Pounds	Percent	Pounds	Percent	Pounds	Percent
1	:	1,347,194	50.8	1,303,754	49.2	N.A.	N.A.
2	:	7,736,484	55.5	6,192,164	44.5	N.A.	N.A.
3	:	3,467,879	38.7	4,380,034	49.0	1,099,312	12.3
4	:	<u>4,382,033</u>	64.8	<u>1,853,866</u>	27.4	<u>527,052</u>	7.8
All growers	:	16,933,590	52.5	13,729,818	42.5	1,626,364	5.0

N.A. = Not Available

Canners were the major outlet for stratum 1 firms, accounting for 41.7 percent of total sales by these firms. Repackers, with 24.9 percent of total sales, were the next most important outlet. If 70 percent of sales to repackers were utilized in the fresh market, then fresh market sales through repackers would amount to 17.7 percent of total sales. This is less than sales to netmen and commission merchants, 24.1 percent of total sales. ^{10/} Sales to netmen and commission merchants, generally in 3-pound baskets, thus constituted the major fresh market outlet for stratum 1 (small firms). Sales to the remaining outlets, chainstores, retailers, and wholesaler-distributors, all essentially fresh market outlets, accounted for 9.1 percent of total sales.

Canners accounted for a substantial part of total sales for stratum 2 firms, at 4.2 million pounds (30 percent). This outlet ranked second in importance to repackers, with 5.4 million pounds (38.7 percent). Third in importance were sales to wholesaler-distributors, 2.4 million pounds (17.3 percent). These sales must necessarily consist of 3-pound baskets and 10-pound lugs. The relative unimportance of sales to commission merchants is readily explainable since industry

^{10/} Sales to netmen are generally made at the New York market price the following the delivery day. Prices to netmen are the New York price less transportation to the New York market and sales commission. When supplies are tight, netmen may be required to offer a premium over the New York price.

sources indicate that growers, on the average, receive a slightly higher price from netmen than from commission merchants. It would also appear that the larger size of these stratum 2 firms makes them a more reliable source of supply for netmen than their smaller stratum 1 counterparts. Competition among netmen thus insures that only a small quantity of this price competitive product is sold on commission through commission merchants. 11/ Netmen also serve as an alternative to sales to repackers, a significantly large sales outlet for stratum 2 firms.

Sales to canners by stratum 3 firms accounted for 40.7 percent of total sales, the largest single outlet for these firms. Sales to repackers and wholesaler-distributors ranked second and third in importance, accounting for 27.5 and 15.5 percent of total sales, respectively. Conceivably, the larger average volumes marketed by stratum 3 firms requires some assurance of both an extensive market and of a relatively firm price. Either or both of these characteristics may be absent in sales to netmen outlets for stratum 3 firms. Contrary to this line of reasoning are sales to netmen by stratum 4 firms, which accounted for 9.4 percent of total sales by these firms. An examination of the raw survey data indicates that all sales to netmen in this instance were accounted for by one of the four firms in this stratum.

Sales to wholesaler-distributors were the major outlets for stratum 4 firms, accounting for 34.6 percent of total sales. Next in importance were sales to repackers (29.7 percent). The concentration of sales in these two outlets indicates that those firms with large average volumes require extensive markets and reasonably firm prices. 12/ Sales to canners by stratum 4 firms, although quantitatively significant (18.5 percent of total sales), ranked fourth in importance as an outlet for these firms. Canners were relatively unimportant as a market for stratum 4 firms, in comparison with the other strata.

Prices and Pricing

Many, perhaps most, mushroom growers are price takers. Other firms, particularly large mushroom growers, dealing through market intermediaries may be able to exert some price leverage

11/ "Price competitive" alludes to the fact that sales to netmen and commission merchants bring essentially the same net return to the grower.

12/ "Extensive markets" has a twofold meaning, as used in this context. It means both a requirement by buyers for relatively large unit shipments and a willingness at least by some buyers to accept any reasonable quantity shipped by the grower.

on the buyer. A shortrun critical supply condition, or other factors such as a reputation for quality and/or the ability to provide a regular supply in line with the buyers' requirements, can affect price leverage. The availability of this leverage will depend on the particular market channel and the grower's reputation and market acumen. An effort was made to quantify the essential features of the price discovery process as it was utilized by the sample firms in various market channels. However, the survey technique used in this study was not adequate for this purpose.

All growers were queried as to whether they verified price bids from buyers with prices from other sources. Sixty-nine of the firms (72 percent) indicated that they did. Of these, 32 percent indicated that they used other growers to verify price bids, 11 percent used buyers, 36 percent used both growers and buyers, and 21 percent used other sources. Fifty-six percent of the firms felt that the available price information was adequate, and 44 percent felt it was not.

Eighty-nine percent indicated dissatisfaction with their current marketing options. Of these, 27 percent felt there were not enough buyers, 25 percent indicated there was not enough competition, 29 percent indicated that the price was too low, and 12 percent indicated dissatisfaction with canners, whom they believed to be the price maker.

A Cooperative Role

The Agricultural Cooperative Service sought to determine the general attitude of a wider audience of growers toward the cooperative concept; their willingness to consider a cooperative as a possible remedy to some industry problems; and their willingness to support a cooperative financially, with a full production marketing agreement. 13/

Growers were asked to respond to the following queries:

- Do you think a producer-owned marketing cooperative based on producer needs could improve mushroom marketing?
- Would you be willing to join such a cooperative and purchase stock (in proportion to your use) if an economically sound program could be developed?
- Would you be willing to sign a marketing agreement with the cooperative (a contract that obligates you to sell all your output through the cooperative)?

13/ The Agricultural Cooperative Service (ACS) provided a major role and considerable resource support in the design and implementation of the grower section of the mushroom survey in response to requests from a specific group of growers to determine if there is a potential role for a mushroom growers' cooperative.

Table 21--Number of growers responding to a grower-owned marketing cooperative as an improvement in mushroom marketing, by strata

Stratum	Growers	Yes	Maybe	No	Do Not Know
1	31	12	12	5	2
2	44	15	15	8	6
3	9	2	4	2	1
4	5	3	1	0	1
All growers	89	32	32	15	10

Table 22--Number of growers willing to purchase stock in a mushroom marketing cooperative, by strata

Stratum	Growers	Yes	Maybe	No
1	24	19	0	5
2	36	27	2	7
3	7	5	0	2
4	5	4	0	1
All growers	72	55	2	15

Table 23--Number of growers willing to sign a full production marketing agreement with a mushroom marketing cooperative, by strata

Stratum	Growers	Yes	Maybe	No
1	24	18	2	4
2	36	23	2	11
3	6	4	0	2
4	5	4	0	1
All growers	71	49	4	18

Thirty-two, or approximately 36 percent of the 89 respondents to the first question, believed that a cooperative could improve mushroom marketing and could possibly be an improvement (table 21). Seventeen percent believed that a cooperative would not be an improvement. Fifty-five, or 76 percent indicated a willingness to purchase stock, 21 percent said no, and 3 percent were undecided (table 22).

For the question dealing with growers willingness to sign a full production marketing agreement, 69 percent responded affirmatively, 6 percent indicated they might sign such an agreement, and 25 percent said they would not. In general, a substantial proportion of the mushroom growers responding to the cooperative-related questions indicated a belief that a marketing cooperative alternative would be of benefit. They would support such an organization financially and with their mushroom production if an economically sound program could be developed.

Grower Contracts

The survey team became aware of the existence of two different situations in which buyers were contracting with growers on an annual basis for a grower's total production. One situation involved purchases of processing mushrooms and the other purchases of repackable mushrooms. Both contracts committed the grower for his total production, both stipulated the sale price; and both contracts included provisions for price changes during the contract period. Industry sources indicated that these two formal contracts were probably the only formal contracts in force in the survey area during the 1980 calendar year.

Eighty-three growers responded to the query, "Do you contract your mushroom sales?" Twenty firms, of the respondents, answered yes. Among these respondents, 16 firms indicated that the contract terms included price, and 19 firms that the contract terms included quantity. Apparently some growers were not cognizant of their contract obligations.

Grower Payments

Considerable dissatisfaction was expressed by many respondent firms over the length of time between delivery of mushrooms and receipt of payment. Responses to the query, "When is payment received?" are summarized in table 24. Since many growers sell through more than one outlet, the total number of responses exceed the number of growers in the survey. An examination of table 24 indicates that 33 responses were received from growers selling to canners. A total of 24 respondents (73 percent) indicated that payments from canners were delayed in excess of 21 days after delivery of mushrooms, with 8 of the 24 respondents indicating a delayed payment in excess of 6 weeks. Repackers, the other major outlet for most growers, had a slightly better payment record than canners,

Table 24--Number of responses to estimated time lapse between delivery of mushrooms and receipt of payment, by market outlet, calendar year 1980

Outlets	Number of days							Total
	:1-7	: 8-14	: 15-21	: 22-28	: 29-35	: 36-42	: Over 42	
Canners	: 1	2	6	5	4	7	8	33
Other processors	: -	2	2	1	1	1	-	7
Repackers	: 3	4	9	9	3	2	-	30
Netmen	: 3	3	6	5	5	2	-	24
Commission merchants	: 3	-	-	-	-	-	-	3
Wholesaler-distributors	: 2	2	1	1	1	1	-	8
Chainstore	: -	-	1	-	-	-	-	1
Retailers	: 1	1	-	-	-	-	-	2
Other	: 2	1	-	-	-	-	-	3
Total	15	15	25	21	14	13	8	111

with 21 (70 percent) of the 30 respondents indicating payment was received between 2 and 5 weeks after delivery.

Netmen are an alternative outlet for many smaller growers. Products sold through netmen are priced at the New York terminal price for the day following receipt less transportation to New York and netmen charges. Theoretically, there is no price advantage between sales to netmen and sales to commission merchants. Three respondents indicated sales to commission merchants with payment within 7 days. Twenty-four respondents reported sales to netmen with the payment period ranging from a low of 7 days to a high of 42 days. Sixteen respondents (67 percent) indicating sales to netmen reported payment received between 2 and 5 weeks from the time of delivery, certainly not a record of prompt payment. In view of this payment record, sales to netmen are a rational option to sales to commission merchants only if prices paid by netmen exceed the New York price by some guaranteed premium or if the sales price is not strictly contingent on the New York price for the following day.

Industry sources indicate that, over time, prices paid to growers by netmen will exceed prices for the same quality product sold through New York market commission merchants. Netmen utilize prices generated on the New York market

primarily as a basis for prices paid to growers and at times as a basis for prices charged wholesale customers. Prices paid to growers by netmen will often exceed the New York price by as much as \$0.05 per pound for mushrooms of the same quality. During periods of heavy supply, relative to anticipated sales, the premium paid by netmen will be reduced and in some instances prices paid to growers may fall below the New York price. Netmen also utilize the New York market as an outlet for mushrooms which are surplus to their ordinary sales, establishing relationships with one or more New York commission firms and, hence, a daily source of price information. Growers have the same option of using the New York market as an alternative outlet and as a source of price information to improve their bargaining position with netmen and other market intermediaries.

"Slow pay" is obviously a very serious problem in the mushroom industry. Its impact is particularly severe on growers with limited marketing alternatives. If the delayed payment exceeds 50 days, the grower has marketed a full crop from any given house without receiving a commensurate return that would enable the grower to pay creditors. Consequently, the grower must seek additional financing at current high interest rates or accept the equally high or higher credit terms of contractors and suppliers.

Most growers deal through market intermediaries who, in turn, are experiencing delayed payment problems with their customers. These intermediary firms have a choice between financing their deficits or delaying payment to growers. Under these circumstances, the less costly alternative to the intermediary firm is to delay payment to the grower.

Delayed payment problems are particularly acute among growers selling to canners, especially when the canning sector is the only market outlet for them. Canners are encountering their own set of marketing problems resulting from competition with imports and a consequent weakening of their profit position. Raw product utilized by canners must be processed and inventoried prior to sale. Canning revenues are dependent on the canning firm's ability to move inventoried finished products. Reductions in the rate of inventory turnover are immediately reflected in a reduction in the canner's cash flow. Delays in payments to growers serve to ameliorate the impact of this reduction in cash flow since this delayed payment mechanism forces the supplying grower to finance a large part of the canner's inventory. In the strictest sense, the delayed payment mechanism is a forced loan from the grower to the canner at a zero interest rate.

The Major
Integrated Firms

Preliminary investigations based on fragmentary data had indicated that the U.S. market for fresh mushrooms was dominated by five firms, accounting for 75 to 80 percent of fresh mushroom sales. These firms were Butler County Mushroom Farms, Campbell Soup Company (Camsco), Castle and Cooke, Inc., Monterey Mushrooms, Inc., and Ralston Purina, Inc. All of these firms are individually contacted during the course of the industry survey, but Monterey Mushrooms was not included in the detailed analysis.

Castle and Cooke's growing and sales operations are principally confined to the west coast; Ralston Purina and Campbell Soup have multiple production and sales outlets nationally; Butler County operates from essentially a single location in western Pennsylvania. Butler County Farms is a unique growing organization in that limestone caves constitute the growing facility. This firm has been in operation since 1937. Castle and Cooke entered into mushroom production and sales with the purchase of an existing growing facility in California in the early 1970's. This firm has since constructed additional facilities in other States. Ralston Purina entered into mushroom production and sales with operations at a San Jose, California, plant in 1974. Ralston Purina subsequently constructed plants in Florida, Texas, Illinois, Tennessee, and Connecticut. Campbell Soup was the last of the four firms to enter into fresh mushroom production and sales, in the latter part of 1978, by purchasing existing firms rather than constructing new facilities.

Industry
Concentration

All data supplied by the major firms have been aggregated to avoid disclosure of proprietary information. Total mushroom production for the four major firms was approximately 215.2 million pounds, or 46 percent of U.S. production in calendar year 1980. Of this amount, 144.4 million pounds were sold fresh. This is approximately 48.2 percent of estimated U.S. fresh market sales, considerably less than the previously reported 75 to 80 percent. It is impossible to determine whether the higher concentration ratio has fallen to its present level over the past few years or whether the industry source was in error.

Estimated sales to processors by the four firms amounted to 70.8 million pounds in 1980, or approximately 41.5 percent of all sales to processors. Mushroom processing utilized an estimated 33 percent of the four firms' total production. This is only slightly higher than the 30 percent processing utilization indicated by Pennsylvania repackers, a functionally comparable marketing sector.

Fresh market sales by the four firms are widely dispersed geographically. Head-to-head competition in fresh markets is limited, with many individual markets serviced by one or no more than two of the four major firms. Many of the fresh markets served by these firms are also serviced by repackers and other market intermediaries from the PAMDEL area, as well as by large local firms oriented to specific markets in the eastern half of the country. Lack of direct competition among members of the top four firms in any given area reflects a rational selection of potential market areas by these firms.

Optional
Characteristics

The T-4 firms filled an estimated 54.3 million square feet of growing area in the calendar year 1980. The weighted average yield for all firms amounted to 3.62 pounds per square foot, considerably above that reported by the PAMDEL firms--2.57 pounds per square foot. Tray systems predominated with 12 plants out of 20 using this technology and accounting for approximately 70 percent of the total production of the T-4 firms. Currently, only one of the T-4 firms purchases mushrooms from growers.

The T-4 firms channel mushrooms that exceed fresh-market requirements, or that fail to meet fresh-market quality standards, to processing plants. Approximately 66 percent of this processing is done in their own plants, with the remaining 34 percent shipped to other processors.

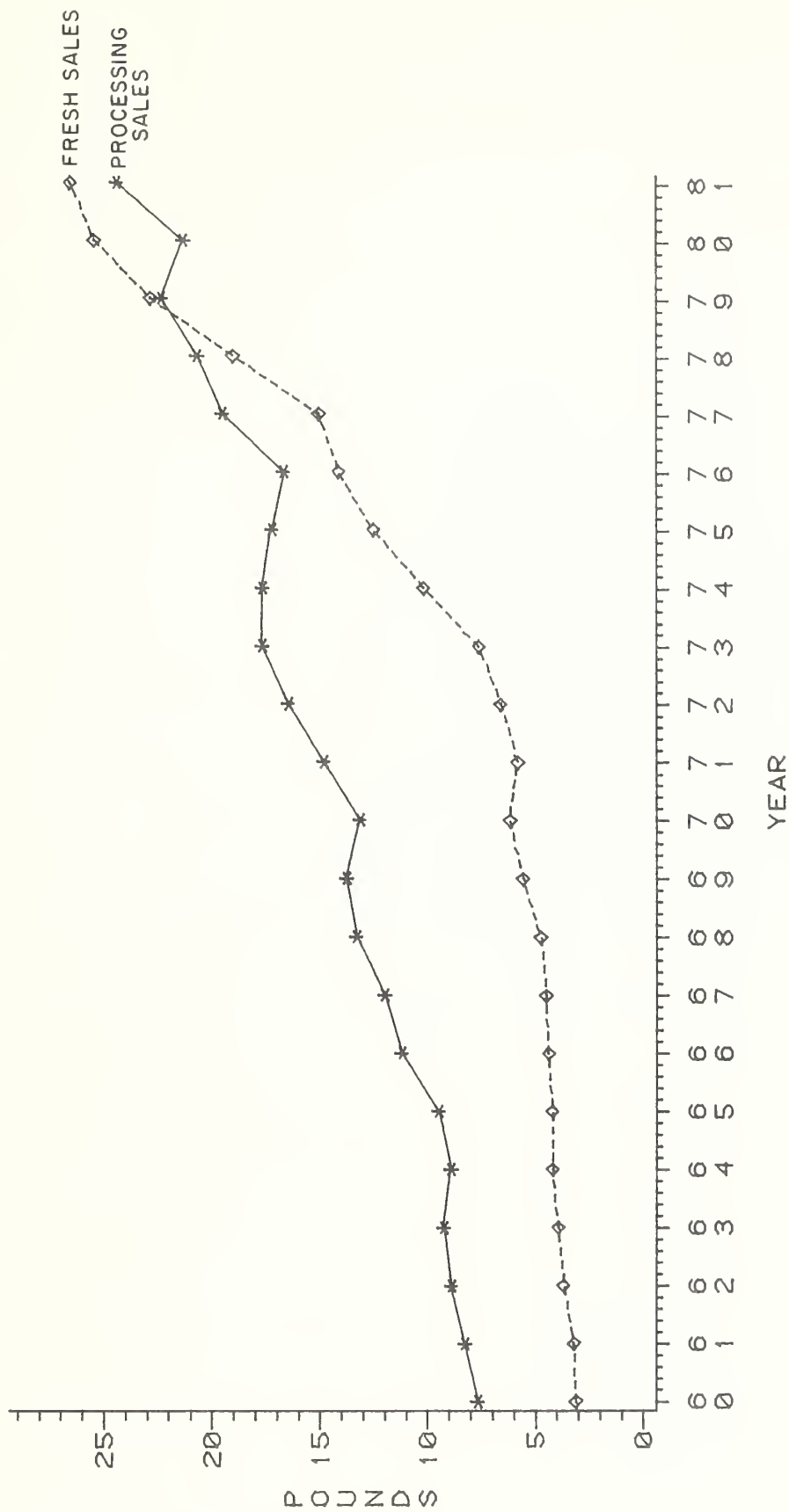
Merchandising
Fresh Mushrooms

Early contacts with growers and repackers in the PAMDEL area revealed a surprising lack of effort directed at increasing the level of mushroom sales through product promotions. Responses to the industry survey indicated minimal or zero funds budgeted to product promotion; the absence of or, at best, limited assignment of specialized personnel to marketing or promotional activities; and the absence of any type of formal merchandising policy or program.

In contrast, three of the top four firms utilized a mushroom sales force of from 8 to 12 persons, and all firms had assigned sales responsibilities to personnel in senior executive positions (vice presidents). All of the T-4 firms reported that they budgeted funds for mushroom promotions.

A number of industry sources have indicated that penetration by one or more of the T-4 firms into traditional markets has resulted in increased sales by other firms servicing these markets. These sources attribute the sales increase to a spillover effect from the merchandising efforts of the T-4 firms. Of special interest is the acceleration of fresh mushrooms sales in the mid-1970's, the period during which three of the firms initially entered the market (figure 14).

FRESH AND PROCESSING MUSHROOM SALES FOR CROP YEARS 1960 TO 1981



SOURCE : INTERNATIONAL TRADE COMMISSION AND THE STATISTICAL REPORTING
SERVICE, U.S. DEPARTMENT OF AGRICULTURE.

Figure 14.--Fresh and processing mushroom sales, crop years 1960-81

REPACKERS AND OTHER INTERMEDIARIES

Merchandising is only a part of the improved sales. Other growth is possibly due to the movement of production and sales efforts into fresh mushroom deficit areas and to changing consumer food preferences.

REPACKERS AND OTHER INTERMEDIARIES

Scope of the Survey

Repackers are essentially middlemen, linking mushroom producers to the fresh mushroom market. Their major marketing functions are assembly, grading, packing, and distribution to wholesale outlets. In many instances, they constitute the only fresh market access available to growers. They are particularly important to small growers, who have insufficient volume to meet market requirements and/or to perform repacker functions efficiently.

Repackers receive fresh mushrooms from growers in bulk 10-pound lugs for subsequent re-sale. They may be re-sold in the bulk 10-pound lugs to wholesaler-distributors, retail chain warehouses, or in some cases, directly to individual retailers. Alternatively, the mushrooms may be repacked in 8-, 10-, 12-, or 16-ounce overwrap containers, assembled on flats, and sold to the same outlets. Bulk mushrooms are sorted to remove offgrades and foreign material and, in some cases, are washed before repacking. A number of repackers also pack "fancies" and "specials" (promotional descriptions for selected U.S. No. 1 mushrooms) in 3-pound (4-quart) wooden baskets. The packages may be sold to conventional outlets, wholesalers, and chains, or to netmen. Supplies of No. 1 grade fresh mushrooms in excess of fresh market needs may be resold to processors or processed.

A list of repackers was obtained from the listing of produce buyers maintained by the Fruit and Vegetable Division, Agricultural Marketing Service, USDA, under the registration requirements of the Perishable Agricultural Commodities Act. Since this listing is by counties, it would not necessarily include all repackers operating in the area if their major business location is in a county relatively distant from the Kennett Square/Temple area. The probability of this occurrence was reduced by including in the list any mushroom repacker whose business address was in any county in Pennsylvania, Maryland, and Delaware adjacent to Berks, Chester, or Delaware Counties in Pennsylvania.

A total of 14 repackers operated in the Kennett Square/Temple area of Pennsylvania. All repackers were contacted by phone to obtain an estimate of the normal volume handled by these firms. The list was subsequently stratified into three size

groups on the basis of these normal volume estimates. This procedure yielded three size strata, distributed in the sampling universe as follows: two large firms (10 to 15 million pounds), eight moderately sized firms (5 to 10 million pounds), and four small firms (under 5 million pounds annually). A representative sample of nine firms was then drawn over the three strata in the sampling universe. This sampling procedure yielded one large firm, five moderately sized firms, and three small firms. Management personnel in all nine firms were contacted and surveyed over a 2-week period in May of 1981.

Operating Characteristics

Sources of Supply

The survey schedules taken from the nine sample firms were not complete in every respect. In most instances, however, there was sufficient information to document the operations of this important sector of the industry. The nine firms reported mushroom receipts of 55 million pounds in 1980, or an average of approximately 6 million pounds per firm. Roughly one-third of these receipts, 17.2 million pounds (31.2 percent), were from repackers' associated growing operations. Three repackers reported no associated growing operation. Approximately 60 percent of repacker receipts, 32 million pounds, was received from other growers, with only one repacker reporting no purchases from other growers. Other sources of repacking mushrooms were other repackers, 1.8 million pounds (3.4 percent); canners, 3.1 million pounds (5.7 percent); and sources not otherwise identified, 837,000 pounds (1.5 percent).

Types of Packages

Repackers that operated growing operations controlled a total growing area of 4.4 million square feet, or an average of 489,000 square feet per firm. Those who purchased mushrooms from growers obtained them from 159 growers in 1980. ^{14/}

Repackers were requested to indicate the quantities marketed fresh by type of package (table 25). These data indicate total fresh market sales of 38.7 million pounds, or 70 percent of receipts by repackers from all sources. Over 50 percent of this sales volume was accounted for by two container types, the 12-ounce overwrap (27.1 percent) and the 10-pound lug (31.8 percent). The 3-pound basket, constituting 3.7 percent of sales by repackers, is understated in terms of its importance to the fresh market, since growers used this package to sell a substantial quantity of fresh market mushrooms directly or through netmen or commission merchants.

^{14/} Growers who sold to more than one repacker in 1980 were double counted.

Table 25--Fresh market sales of nine repackers, by type of package and percentage of fresh-market sales, calendar year 1980

Package	Pounds	Percent
3-pound baskets	1,437,460	3.7
8-ounce overwrap	5,646,369	14.6
12-ounce overwrap	10,490,502	27.1
16-ounce overwrap	1,939,246	5.0
10-pound lugs	12,322,743	31.8
Other	6,879,300	17.8
Total	38,715,620	100.0

Table 26--Fresh market sales of nine repacker firms, by type of buyer, calendar year 1980

Type of buyer	Pounds sold	Percent sold
Chainstores	11,868,000	30.7
Fruit and vegetable wholesalers	24,984,000	64.5
Netmen	790,000	2.0
Other ^{1/}	1,074,000	2.8
Total	38,716,000	100.0

^{1/} "Other" indicates retail food stores, mass feeding outlets, and institutional sales.

Sales Outlets The nine repacking firms reported that the bulk of all fresh market sales was channeled through two market outlets--chainstores, 30.7 percent; and fruit and vegetable wholesalers, 64.5 percent (table 26). Sales to other outlets were relatively unimportant.

Sales of Processing Mushrooms Repackers often receive mushrooms from growers in excess of their fresh market requirements. In these instances, the excess mushrooms are re-sold to processors at the current processed mushroom price and the grower's price is adjusted accordingly. In other instances, fresh mushrooms from growers may not be of repacking quality. They must be disposed of to canners or other processors at processing prices. In the repacking operation, repackers will always sort out a small quantity of culls which can be marketed to processors. Marketings of mushrooms to processors by the sample repackers amounted to 17.3 million pounds, or approximately 31 percent of total mushroom receipts in 1980.

For the sample repacking firms, the markup on the price of processing mushrooms purchased from growers and sold to processors ranged from zero to 2 cents per pound over the grower price. Alternatively, repackers can arrange to have processing mushrooms toll-packed to their account in one of the area's processing plants. One sample repacker followed this practice for a portion of his processing mushrooms, and had them sold through a broker (similar to the way canners sell their products).

Business Organizations

The sample repackers have been engaged in repacking mushrooms for an average of 18.2 years, ranging from a low of 4 years to a high of 56. Median time in business was 14 years. Eight of the nine repackers were corporations and the remaining firm was a partnership. These repacker corporations were small, family types with an average of two shareholders per corporation. Repacking operations for all of the sample firms were at a single location.

The diversity in volume and packages handled, age of plant, and equipment and functions performed precluded the development of meaningful data on investment in plant and equipment for the sample firms. Essential features of a typical plant are sufficient space to house the necessary product lines, cold storage, dry storage, and administrative facilities. Equipment requirements depend on the number and type of repack lines and whether mushrooms are packed dry or wet.

Mushrooms generally arrive at the repacking plant on skids weighing approximately 1,200 pounds gross. Plants receiving appreciable quantities of the product in this form require fork-lift trucks for moving it into the plant and for loading out skids of repacked product. Trucks are needed for picking up skids of product from growers and for transporting finished product to the market. These are generally tractor-trailers. The required number and size of all vehicles depends upon the volume handled by the plant.

Plant Operations

Eight of the nine sample firms had year-round operations, while the remaining firm repacked only during the winter months. Two firms reported peak sales in November through April, three firms in November through December, two firms in March, and one firm had relatively stable operations over the year. Three of the sample plants indicated that sales were lowest in July and/or August, while two firms did not indicate a seasonal sales pattern.

Six firms actively solicited mushrooms from growers by calling on or phoning growers to set up supply commitments based on their requirements. Two of the nine sample firms thought

their oral agreements with growers constituted a contract.

Common terms of the contracts were specified as follows: to take all of a grower's production, to pay the going or field price, and to withhold payment for 3 weeks after receipt and pay in the fourth week.

Six firms reported picking up all mushrooms from growers; two firms, 50 percent; one firm, 80 percent; and one firm, 10 percent. Supply areas for repackers ranged up to a radius of 25 miles from the packing firm location. Among the firms responding to this query, four firms indicated a supply area radius of up to 15 miles; three firms, 5 to 10 miles; and, two firms, 20 to 25 miles.

Procurement Price
Policy

All firms were asked to comment on their procurement price policy. Five firms responded that they purchased at the market level (recognized field price) and three firms indicated their policy was to meet the competition. One firm indicated a policy of paying 2 to 3 cents per pound over the processing price, purchasing only small quantities at irregular intervals to fill orders in excess of its own production. This firm essentially followed a spot-market purchase policy.

Four firms indicated that their relationship with growers was very stable, three firms thought it was relatively stable, and two firms considered it unstable. In this instance, stability was measured by repeated dealings with essentially the same group of grower-suppliers. One firm indicating a stable relationship with growers reported it had a firm policy of minimizing the number of growers and retaining only those growers who scheduled production to meet the firm's needs.

All firms surveyed responded "no" when asked whether they financed growers to obtain their production. On occasion, one firm advanced payments to assist a grower with financial problems.

None of the sample firms operated subassembly points for grower receipts. All firms gave growers the option of having the repacker pick up at the growing operation or delivering direct. Common practice called for growers to receive a premium of 2 cents per pound if delivered to the repacker's plant.

Grades and Grading USDA standards for fresh mushrooms provide for two grades--U.S. No. 1 and U.S. No. 2--and for two sizes--small to medium, up to 1-5/8 inches in diameter and large, over 1-5/8 inches in diameter. 15/

The sample repackers were in general agreement that a No. 1 prime mushroom is a firm, tightly veiled, clean-cut white or off-white mushroom, free from dirt, spots and fly damage, and of moderate size. They differed in that individual firms had different degrees of tolerance for various defects; for example, some firms said they will accept up to 2 or 3 percent with open veils, and others, up to 5 percent in No. 1 primes. Most would not accept any mushrooms with spots or fly damage as No. 1 prime.

All of the firms reported that grades are assigned by the pickup driver, with a right of appeal to the plant if the grower disagrees. The firms maintained that they reserve the option of changing the grade assigned by the pickup driver. Repackers admit that grade tolerances as they apply them are not rigid, but they contract and expand in accordance with changes in supply-demand relationships in the market. When supplies are short relative to demand, grade tolerances are increased; when supplies are long relative to demand, tolerances are reduced. This type of reaction to changes in market conditions is normal.

Soup-grade is a trade term used to describe No. 1 fresh mushrooms which do not meet repack standards because of color. The price for soup-grade mushrooms is between the prices for No. 1 primes and utility grades. Mushrooms in the utility grade are sometimes referred to as "culls," "spots," or "opens" and bring the lowest price.

15/ U.S. Standards for Grades of Mushrooms, Agricultural Marketing Service, USDA, Washington, D.C. U.S. No. 1's are defined as fresh mushrooms of similar varietal characteristics, which are mature, fairly well shaped, well trimmed, free from open veils, disease, spots, insect injury, and decay and damage from any cause. Requirements for the U.S. No. 2's fresh market grade are the same as No. 1's except for a greater tolerance for open veils and other defects. Tolerances for open veils within each grade expand as the mushroom moves through market channels from shipping point, en route, or at destination. Tolerances for disease, spots, and decay are limited to 1 percent for both No. 1's and No. 2's.

USDA standards recognize two grades of canning or processing mushrooms, No. 1 and No. 2 processing grades. In practice, there appears to be only one grade of processing mushrooms other than the utility grade, since prices are quoted only for processing (combining No. 1 and No. 2) and utility grade mushrooms. One of the sample repacking firms described No. 1 canning mushrooms as clean-cut white, off-white, or creme mushrooms with 15 to 20 percent opens. The percent of open veils is not a relevant standard for either the No. 1 or No. 2 USDA grade for processing mushrooms.

Varietal Premiums
and Discounts

Repackers generally attempted to purchase the white variety of mushrooms in preference to off-whites and cremes. There was practically no agreement on the pattern of pricing differentials. Some repackers paid a premium of 2 cents per pound for whites, while others discounted off-whites and cremes in a range of 2 to 5 cents per pound.

Mushroom Quality
Maintenance

As a general rule, mushrooms arrive at the repacking plant on the same day they are picked. In some few cases where growers maintain cold storage facilities, they may arrive the morning following picking. All of the nine sample firms indicated that they attempted to precool mushroom receipts to a pulp temperature of 34 to 38 degrees to maintain quality. Four firms reported that all mushroom receipts were packed and shipped on the same day they were received. Five firms claimed shipment was made no later than the day following receipt.

Mushrooms arriving at the packing plant are often discolored from dirt acquired during the growing operation or at the time they are picked. ^{16/} This soil can be removed by washing at the packing plant. This practice is not universal since washing removes a certain desirable bloom from the mushroom and shortens the shelf life. Furthermore, some buyers prefer a dry (unwashed) mushroom. Three of the repacking firms washed all output. Four of the firms did not wash any part of their output. One firm indicated that unless otherwise notified by the buyer, mushrooms shipped to buyers within a 600-mile radius are washed while those shipped a longer distance are shipped dry.

Mushrooms are shipped in refrigerated trucks or trailers. Eight of the firms indicated that the bulk of all shipments would arrive at their destination on the same day they left the plant. One claimed that no shipment would exceed 12 hours in transit time.

^{16/} High CO₂ levels cause the mushroom to fruit beneath the casing soil and the mushroom top carries soil with it as it grows. This problem can be controlled with proper air movement.

Although repackers have some control over product quality during the repacking operation, this control is lost once the product is delivered to the buyer's warehouse. The sample firms were queried as to whether they maintained any type of customer education program directed toward product quality maintenance. Six firms responded negatively but two firms maintained an informal program. One firm said that it had no formal program but actively followed up customer complaints by assisting the customer in identifying and eliminating problem areas in quality maintenance.

Shelf life of bulk mushrooms was estimated to range from 3 to 6 days, with an average of 5 days. The estimated shelf life of overwraps ranged from 2 to 7 days with an average of 5 days and the estimated shelf life of 3-pound baskets ranged from 4 to 7 days, again with an average of 5 days.

Product
Merchandising and
Sales Practices

Products sold by repackers move from the distribution channels of the mushroom industry into the acquisition (supply) channels of the more broadly defined fresh produce and retail food sales industries. One objective of the repacker survey was to examine the activities of the sample firms in this merchandising role.

Repackers were first queried as to whether they maintained an outside sales force for accessing current and potential customers. All of the nine sample firms responded negatively. Most repackers initiated contacts with existing and potential customers by personal visits with wholesalers and distributors supplemented with phone calls as needed.

An effort was made to discern the type of legal relationship that repackers believed existed between repacking firms and customers, that is, contractual or noncontractual. Eight firms said that all agreements with customers were oral, informal, and noncontractual. One firm appointed distributors, giving them an exclusive right to market the repacker's packer-label product in the individual distributor's market area. This agreement called for a full supply commitment by the repacker, stipulated that sales would be at the market price, and called for a weekly determination of the market price. Other provisions related to credit terms (30-day maximum) and provisions for discounting prices in specific periods for purposes of sales promotion.

Among terms stated by repackers as part of their oral agreements were those relating to credit. Two firms stipulated a maximum of 14 days credit and two, a maximum of 21 days. One of these latter firms indicated, however, that some accounts had run behind as much as 49 days without any action by the firm.

A common sales promotion practice of retail produce purveyors is to run advertised price specials for specific commodity items for selected periods of time. These specials are run with the cooperation of produce suppliers who discount current shipments for the period of the special. All of the respondent firms indicated that they were aware of or had cooperated with wholesalers and distributors in this type of promotion. Two firms mentioned a specific quantitative policy with respect to the level of the discounts allowed for promotional reasons. One of these firms followed a 10-percent discount policy for selected periods during the winter months while the other had a policy of reducing product prices by 2 cents per pound. Other firms did not indicate a specific policy but would meet the competition.

One firm budgeted a minor dollar amount for trade advertising. Four firms made no budget provision for either sales promotion or advertising, and four firms did not respond to the question.

Bulk Sales Sector

The marketing survey identified five bulk sales operations in the Kennett Square area of Pennsylvania. These firms purchase mushrooms from growers and repackers or utilize a portion of their own production for resale in bulk to canners or other processors. Butler County Mushroom Farms in western Pennsylvania is also a major bulk sales operator. Total bulk sales of these firms plus Butler County amounted to 44.6 million pounds in 1980. Sales may be made to canning firms in the Kennett Square/Temple area or to firms in other parts of the country. The largest concentration of bulk sales by the sample firms appear to be in local Pennsylvania markets, the Midwest, and Mid-Atlantic States. For example, one midwestern canner is totally dependent on bulk sales by these firms for all of his canning stock. All of the bulk sales firms contacted had some other association with the mushroom industry; for example, they were either integrated growers with a fresh market orientation, repackers, canners, or different combinations of these.

Markups over processed mushroom prices paid to growers generally range from 2 to 3 cents per pound or approximately 5 percent over the field price.

Relations between bulk sellers and their customers are relatively informal. Most contacts are made by phone. Transportation is arranged by the sellers, who may use their own or leased vehicles or make contract hauling arrangements. The buyer absorbs the freight, either added to prices quoted as f.o.b. shipper or through the price mechanism whereby prices are quoted as f.o.b. buyer's plant.

CANNING SECTOR

Scope of the Survey

Industry sources provided information which served to identify 14 mushroom canners who purchased significant quantities of mushrooms from growers in the study area. ^{17/} Two of these canners were located in Michigan, one in eastern Ohio, one in New Jersey, one in Delaware, and the remaining nine firms were located in the Kennett Square/Temple area of Pennsylvania. Four of the Pennsylvania canners were small firms, processing 2 to 10 million pounds per year. A complete schedule was obtained from only one of the Michigan firms and incomplete but usable schedules were received from the Ohio and New Jersey firms. Only one of the major Pennsylvania firms supplied data for the study. Three of the major Pennsylvania firms declined to cooperate. Ultimately, data were obtained from four of the smaller Pennsylvania firms and the Delaware firm to give a total of nine schedules for the study.

Unfortunately, the fragmentary nature of the data received from some of the other larger firms severely weakens the statistical base of this portion of the study. ^{18/} Although the smaller firms were generally responsive, within the limits of their recordkeeping activities, conclusions drawn from data supplied may be suspect since the respondent firms cannot be considered entirely representative of the industry.

The U.S. International Trade Commission has issued a number of reports on canners under a series of investigations originating in 1965. The latest report, USITC Publication 1089, August 1980, indicates net sales of \$124 million in 1979, and represents data obtained from 18 firms, accounting for 90 percent of U.S. production of canned mushrooms. Net sales of the eight firms providing sales data in the industry survey amounted to approximately \$48.8 million in 1979 or approximately 39 percent of net sales reported by USITC. Net sales of the sample firms increased to \$50.3 million in 1980, an increase of 3.1 percent over net sales in 1979.

^{17/} USITC reports indicate a total of 18 mushroom canners nationwide.

^{18/} The USITC has subpoena powers to support requests for data during industry investigations. Data for this study were secured entirely with the voluntary cooperation of firms contacted in the course of the study. This fact in itself introduces some bias since those firms in economic difficulty may be more likely to cooperate than those who are not.

General
Characteristics

Cost of goods sold for eight sample firms providing cost data amounted to \$44.3 million in 1979, increasing to \$46.6 million in 1980, an increase of 5.2 percent. Cost of goods sold as a percent of net sales amounted to 90.7 and 92.6 percent for 1979 and 1980, respectively. The comparable 1979 figure for the USITC data was 89.5 percent of net sales. Gross profit margins for the sample plants were thus narrower than the margins reported by USITC for the 18 firms in 1979. Gross profit margins for the sample plants in 1980 were also smaller than in 1979, despite a 3.1 percent increase in net sales.

The decline in gross profit margins of the sample firms appears to indicate a further weakening of the profit position of these firms between 1979 and 1980. The firm sample possibly is more heavily weighted in favor of the smaller firms; consequently, the magnitude of the decline in gross profit margins for these firms may not be representative of the industry as a whole. The USITC has reported that two of the three largest and most technically advanced canning firms show every sign of being able to make adequate profits. ^{19/} None of the sample firms could be so categorized.

Four of the nine sample plants reported outstanding real estate indebtedness of \$1.9 million for 1980. This was less than real estate indebtedness in 1979, \$2.6 million. Seven plants reported other outstanding indebtedness of \$5.6 million for 1979 and 1980, or very little change over the 2-year period. Annual interest payments on outstanding debt for the firms increased from \$748,000 in 1979 to \$1.2 million in 1980, or 56 percent. Interest payments as a percentage of gross margins increased from 16.7 percent in 1979 to 31.2 percent in 1980. This suggests some stabilization in credit requirements in the face of current inflation and at the same time, a probable decline in ability to pay for such credit. The shift in the burden of carrying canned mushroom inventories from canners to growers through delayed payments for processing stock has undoubtedly had a substantial impact on canners' credit requirements.

Operating
Characteristics

Seven of the nine firms were organized as corporations and the other two were cooperatives. All of the corporate firms were closed, family-type corporations. All firms had a relatively long history as mushroom canners, with an average of 25 years in business.

Four of the nine canners grew some part of their raw mushroom stock. These responses understate the significance of the amount of production grown by mushroom canners. The two

^{19/} USITC Publication 1089, Washington, D.C., August 1980, p. 16.

cooperatives, neither with growing operations, depend on their members for the major part of their raw mushroom stock. In at least one other instance, a firm reported the mushroom canning operation as a separate venture, but depended on family members for some part of its raw stock.

Three of the respondent firms reported operating depots for purchasing mushroom canning stock from growers. In all cases, purchases of raw mushroom stock were made at the canning plant. Six firms indicated that mushroom receipts were graded at the plant dock and three firms said they were graded at the grower's shipping point. In all cases, in the event of disputes, the grade assigned at the plant dock prevails.

Four of the eight firms reported that 90 percent or more of raw mushroom receipts were graded as No. 1 canning mushrooms. Receipts of No. 1 canning grade mushrooms ranged from a low of 20 percent of plant receipts in one instance to a high of 100 percent in another. Receipts of No. 2 grade canning mushrooms averaged 21 percent of total plant receipts for the nine respondent firms. Only two firms indicated substantial receipts of utility grade (cull) mushrooms, 47 percent of total plant receipts in one instance and 40 percent in another. Normally, the grade distribution for receipts by the sample plants should be rather uniform. The disparity in the quality of receipts between the sample plants is indicative of some degree of selectivity by canners or of the impact of some other nonrandom factor. Suggested reasons for the indicated disparities are:

- Canners select growers with a known reputation and ability to produce quality mushrooms; hence, receipts of grade No. 2 or utility are minimized.
- Canners purchase mainly from fresh-market-oriented growers and/or repackers; thus, the major portion of plant receipts is surplus prime mushrooms that easily meet No. 1 canning grade criteria.
- The grading system is unevenly applied to mushrooms of the same general quality, resulting in a disparity of grade assignments among plants.
- A canner's individual market for canned mushrooms does not discriminate on the basis of quality; therefore, the purchase and canning of lower priced, lower quality mushrooms is an optimum operational strategy.

Six firms operated on a 12-month schedule. Among the three firms with part-time operations, two firms shut down in July and August, and one firm did so from June to October. Only two of the respondent firms reported fresh market operations. One of these sold in the fresh market from its own production during the summer period when the canning plant was closed.

Employment data from eight respondents indicated a total of 521 employees and an annual gross payroll of \$5.4 million in 1980.

Output for the sample plants ranged from a low of 1,100 to a high of 64,000 cases per week, with three plants averaging 10,000 and four plants averaging slightly more than 2,200 cases per week. Although these data provide some idea of plant size, they are misleading in that case output depends to a large extent on the type of container. Four of the plants packaged primarily in retail size containers of 9 ounces or less, and five firms packaged primarily in institutional size containers, more than 9 ounces.

Prices and Pricing

Four of the eight firms reported publication of a list of prices paid to growers for each grade of mushrooms. Changes in prices were communicated to growers by telephone by five firms, by mail by two firms, and, by the pickup driver by two firms. Six firms reported that they changed prices of processing mushrooms infrequently, two changed prices whenever the market changed and one changed prices once a year. The firm with the annual price change was a cooperative. Consequently, in this instance price performs a different function than in other firms, since all sales are subject to yearend adjustments. Once announced, four of the respondent firms reported that changes in buying prices were effective the following day. Two firms indicated that prices became effective within 1 to 3 days after the change was announced, one firm made them effective immediately, and one firm on the Thursday following the announcement.

These responses tend to support an a priori opinion that prices for canning stock are relatively stable. In economic parlance, they are administered prices. With the supply of processing mushrooms fixed at any given point in time, canners have no incentive to increase prices since competing firms will match price increases and the price-increasing firm will not affect its share of the available supply. Prices will fall, however, at least in the short run, if canners' inventories build up and raw stock receipts exceed normal plant requirements for most, if not all firms. A change of this latter type was noted in the course of the industry survey in the spring of 1981 when unseasonably warm weather brought a significant increase in the supply of mushrooms at the current price level. In that situation, two successive price reductions were announced in a period of 10 days.

Purchases directly from growers are the major source of processing mushrooms for most canners. Aside from canners' own production, canners purchase nonrepackable mushrooms and surplus fresh mushrooms from repackers. Canners may also purchase raw stock from bulk sellers or distressed mushrooms

from brokers or other market participants. Sales to canners by any of these suppliers are at negotiated prices.

The cooperative firms used contracts with growers to supply processing mushrooms as a normal procedure. None of the other firms contracted with growers for mushrooms. One firm reported financing growing operations, which involved credit arrangements for supplies of compost and other production inputs to be provided by the canner.

Canned Product
Sales

The bulk of the canned mushrooms was marketed through brokers. Some firms, however, maintained direct accounts with purchasers. Direct sales ranged from 12 to 40 percent of the output of these plants, with an average of 26 percent. Brokers' commissions ranged from 3 to 5 percent, with 3 percent reported most common.

Only one canning firm reported expenditures for advertising.

Credit terms for sales of canned products varied among the sample firms. Two firms indicated credit terms of 2 percent net 10, six firms 1 percent net 30, and one firm, a straight 15 to 60 days credit extension.

WHOLESALE AND RETAIL
DISTRIBUTION SECTORS

Scope of the Survey

The survey of wholesale and retail distributors was limited to firms located in the Middle Atlantic and Northeast regions of the United States because of resource limitations. A stratified sample was selected from separate populations of produce wholesalers and food retailers (corporate and affiliated groups) based on dollar sales. The sample contained nine produce wholesalers and nine food retailers. The respondent firms handled approximately 20 million pounds of mushrooms in 1980 (none of the wholesaler respondents sold produce to any of the retailer respondents).

Wholesale
Distributors

Eight of the nine produce wholesaler respondents surveyed are located in wholesale food centers in Baltimore, Boston, New York, and Philadelphia (two wholesalers in each center). The other is located on the outskirts of a large metropolitan area. The total estimated 1980 volume of fresh mushrooms handled by wholesalers in the survey amounted to 8.5 million pounds, ranging 40,000 to 3.1 million pounds per respondent, with an average of 943,407 pounds.

Sources of Supply

Repackers were mentioned most often as supply sources by the wholesalers surveyed. Large integrated growers and netmen were mentioned an equal number of times as supply sources. In terms of volume handled by the respondent firms, approximately 59

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percent of fresh mushrooms purchases were from repackers, 28 percent from large integrated firms (grower-repacker), 11 percent from netmen (agents), 2 percent from growers, and less than 1 percent from other wholesalers.

Supply sources for the wholesalers were located in Pennsylvania, New York, and Maryland. Approximately 82 percent of the fresh mushroom volume handled by the firms was from Pennsylvania, and approximately 18 percent from New York. The volume reported from Pennsylvania originated from Berks County (23 percent of total volume handled) and Chester County (59 percent of total volume handled). Firms located in the Boston wholesale food center reported New York State as one of their supply sources.

Wholesalers' Customers

Wholesalers reported their customers were retail food stores, food service outlets, institutions, (schools, hospitals, etc.), other wholesalers, and anyone who paid cash. Of the total pounds reported by those surveyed, approximately 77 percent was sold to retail food stores, 18 percent to other wholesalers, 4 percent to food service outlets, and 1 percent to institutions.

Wholesalers' customers purchased on a cash-and-carry basis, with two exceptions--two of the wholesaler respondents delivered to retail food stores and food service outlets.

Seasonal Supply and Demand

Six of the wholesaler respondents reported difficulty in obtaining sufficient supplies in July and August. One reported there are times throughout the year when supplies were limited, but could not specify the low supply periods. One indicated that supplies have become stable since the large integrated firms have entered the industry. This opinion was supported by three other firms, indicating that supplies were fairly stable throughout the year.

Thanksgiving, Christmas, and Easter seasons were reported by six of the wholesaler respondents as high sales periods, and July and August as low sales periods.

Product Quality Maintenance

Wholesale firms stated that inventory turnover and refrigeration maintained the quality of fresh mushrooms. Orders for fresh mushrooms are placed daily (5 days per week) and mushrooms are received daily. Once received, mushrooms are usually sold within 8 to 10 hours (reported range was 5 to 18 hours). All wholesalers indicated that mushrooms were always in refrigeration. Some wholesalers said they would not accept unrefrigerated mushrooms.

Four reported receiving compensation from suppliers for fresh mushrooms that were unsalable due to damage or deterioration.

Of the four, two were given credit for unsalable products, one could return unsalable merchandise (up to 5 percent of its receipts), and one received compensation only if merchandise was received in poor condition.

Product and
Supplier
Preference Factors

Product preference factors are expressed in terms of type of pack handled (3-pound basket, 10-pound bulk, cello-pack, etc.). All of the wholesale firms reported handling fresh mushrooms in 3-pound baskets. Two New York wholesalers reported handling only 3-pound baskets. Seven wholesalers reported handling 10-pound bulk packs as well as 3-pound baskets. Of those firms handling baskets and bulk packs, three also handled 12-ounce cello-packs, one handled 10-ounce cello-packs, and one handled 8-ounce cello-packs. In terms of total pounds of fresh mushrooms handled by the wholesaler respondents, approximately 60 percent were in 10-pound bulk packs, 18 percent were in 12-ounce cello-packs, 16 percent were in 3-pound baskets, 6 percent were in 8-ounce cello-packs, and less than 1 percent were in 10-ounce cello-packs.

Criteria used by wholesalers for selecting fresh mushroom suppliers, in descending order of importance, were: quality, availability, dependability, and price. Quality, according to wholesalers, means white color, tight cap, clean product, few broken stems or separated stems and caps, and no evidence of fly damage or disease. Availability means the supplier can always obtain adequate amounts of mushrooms. Dependability means the supplier delivers the mushrooms at the time and in the condition agreed.

One wholesale firm reported that his first criterion for selecting a supplier is that the supplier agrees not to attempt to peddle mushrooms to the wholesaler's customers.

Pricing

Prices charged to customers are wholesaler's cost plus a percentage markup. As an exception, one firm indicated that costs were subtracted from the wholesaler's sale price to arrive at the price paid to suppliers. In this situation, suppliers did not know their price (or return) until after the wholesaler had sold the mushrooms.

Markups varied among the wholesalers. Two reported using a 10-percent markup, regardless of fresh mushroom pack. One wholesaler who handled only 3-pound baskets used a 15-percent markup. Another reported using an 8-percent markup on cello-packs and a 10-percent markup on 10-pound bulk packs. A 50-cent markup on 3-pound baskets and 10-pound bulk packs was used by one wholesaler. Another wholesaler reported using markups of \$0.15 to \$0.20 per pound on 3-pound baskets, \$2.00 to \$3.00 per flat of cello-packs (a container of twelve 8-ounce packs or ten 12-ounce packs), and \$0.50 on 10-pound bulk packs.

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Finally, one wholesaler reported using markups of \$0.25 on 3-pound baskets and \$1.00 on 10-pound bulk.

Wholesale firms (also the retailers surveyed) indicated that fresh mushroom prices are the most stable of any fresh produce prices.

Promotion

Only four of the wholesale firms reported they promoted fresh mushrooms. Three promoted by lowering prices to customers and one set up displays in the warehouse during the cool months.

When asked if they thought generic promotion of fresh mushrooms would increase sales, seven wholesalers responded positively, one negatively, and one did not know. The messages the wholesalers thought the promotions should contain are nutrition, health, low calories, and price.

Retail Distributors

The nine retail food firms included in the survey are located in the Baltimore, Boston, New York, Philadelphia, and Richmond (Virginia) metropolitan areas. The retailing firms in the sample are corporate and affiliated chains. The retailer distributors in the survey handled approximately 12 million pounds of fresh mushrooms in 1980.

Sources of Supply

Two of the retailers obtained their fresh mushroom supplies from wholesalers in the local wholesale food center. The others reported that they received their supplies of fresh mushrooms from repackers and large integrated growers. Pennsylvania, Connecticut, and New York State were the locations of suppliers reported by these retail firms (that is, those who did not purchase from wholesalers). Unfortunately, retailers were not as specific as the wholesalers in allocating volume among supplier types and locations. Repackers appeared to be the major suppliers, however, and Pennsylvania was the major supply source.

Seasonal Supply and Demand

Seven retailers reported they were always able to obtain sufficient supplies of fresh mushrooms to meet anticipated demands throughout the year. Nevertheless, two of them reported they would like sufficient supplies to promote fresh mushrooms during the summer. Two additional retail firms reported difficulty obtaining supplies of fresh mushrooms in July, August, and September.

Six retail firms reported Thanksgiving, Christmas, New Year's, and Easter to be the peak sales periods. One retailer reported June through December; another, June, July, and August; and a third reported February, March, and April as high sales months.

Reported low sales months also varied among retail firms. Five retailers reported July and August as low sales months; one

firm reported January through May; one reported all winter months are low sales months; and one reported that with the exception of holidays, sales were consistent throughout the year.

Product Quality Maintenance

Retailer respondents reported that the shelf life of fresh mushrooms averages 2 days for 3-pound baskets, 1.5 days for 10-pound bulk packs, and 2.5 days for cello-packs.

These firms claimed that refrigeration and fast inventory turnover (daily ordering) maintained quality and extended the shelf life of fresh mushrooms. Retailers who reported that fresh mushrooms are delivered to their warehouse stated that mushrooms were retained at the warehouse an average of 12 hours (range 5 to 30 hours) before they were shipped to stores. After fresh mushrooms are delivered to retail stores, an average of 7 hours (range 0.5 to 36 hours) lapses before they are normally placed on display. Two retailers required their stores to reduce the price of fresh mushrooms not sold within 2 working days after receipt.

One unusual method of extending shelf life (or at least product appearance) used by one retailer is to display bulk-pack mushrooms in baskets. It reduces the amount of product exposed to customer handling, improving the product holding environment.

Seven of the retailers surveyed reported that their suppliers did not compensate them for fresh mushrooms they could not sell because of damage and deterioration. One of the retailers receiving compensation picked unsalable products up at stores and transported them to his warehouse where the supplier (a large integrated firm) replaced the products. The second retailer receiving compensation reduced the price of damaged products and received credit from the supplier (a terminal market produce wholesaler) in the amount of the price reduction.

Product and Supplier Preference Factors

Product preference factors are expressed in terms of type of pack handled (3-pound baskets, 10-pound bulk, cello-pack, etc.). The retailers surveyed reported a wide variety of preferences ranging from only one type of pack to four types of pack. In terms of total pounds of fresh mushrooms reported by the retail respondents, approximately 55 percent were in 10-pound bulk packs, 21 percent in 8-ounce cello-packs, 19 percent in 12-ounce cello-packs, and 5 percent in 3-pound baskets. One firm reported handling off-whites in 7-ounce cello-packs.

The reporting firms listed, in descending order of importance, quality, reliable service, and price when selecting fresh

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mushroom suppliers. Quality, according to the retailers, means white color (except when purchasing off-whites), tight caps, clean product, few broken or separated stems and caps, and no evidence of fly damage or disease. Reliable service means consistent supply and on-time delivery.

Retailer-supplier relationships once established are, according to the respondent firms, usually long term.

Pricing

Retail firms reported that retail prices for fresh mushrooms are the delivered price (f.o.b. warehouse or retail store) plus a percentage or price markup. Except for two retailers, the average percentage markup for fresh mushrooms was 33 percent (range, 6 to 49 percent). One retailer used a markup of 34 percent on 10-pound bulk packs and 48 to 49 percent on cello-packs. The other exception was a retailer who reported a firm policy of attempting to hold the price of bulk mushrooms at \$0.99 per pound year round. One cooperative reported charging a 6-percent wholesale markup to retail member stores with retailer's adding a markup ranging up to 40 percent.

As was the case with wholesalers, retailers reported that fresh mushroom prices are very stable compared with other fresh produce prices.

Promotion

All of the retailers reported that they promoted fresh mushrooms. Price was used by all retailers in their promotion scheme. In addition, one retailer emphasized fresh and other quality aspects, three retailers tied mushroom promotions in with other commodities (steaks), and one tied them in with holidays.

Six firms reported that they advertised in newspapers. Two used fliers, two used television, and one used radio in addition to newspaper advertisements. Two used only signs in their stores to communicate mushroom promotion messages.

The frequency of mushroom promotions varied among the retailers surveyed. Seven firms promoted mushrooms primarily during the fall to spring production season and the other two promoted them quarterly. 20/

Seven of the retailers surveyed thought generic promotion of fresh mushrooms would increase sales. Two retailers thought generic promotion of fresh mushrooms would not increase sales for these reasons: Only lower prices would increase sales, and brand name promotion is better than generic promotion.

20/One promoted monthly; two monthly, but only in the winter; one 12 times per year, but not in the summer, one promoted 13 times per year; one 8 to 10 times per year; one 6 times per year; and two promote quarterly.

The suggestions and ideas for increasing mushroom sales given by the retail respondents were as follows:

1. Do a better job of keeping instore displays neat.
2. Use combination-type sales promotion, such as steak and mushrooms.
3. Emphasize "fresh"--look at what Ralston, Castle and Cook, and Campbell have done to promote mushrooms.
4. Emphasize nutrition, caloric content, how to use, number of uses, and ease of preparation.
5. See how the National Potato Promotion Board and iceberg lettuce people have promoted their products.
6. State quality and health-related qualities--never emphasize price.

And a negative suggestion: Chainstores should not do the advertising because they have 15,000 items to sell and mushrooms are not one of the big items.

SURVEY PRODUCTION AND SALES ANALYSIS

Based on this study, estimated total mushroom production for 1980 amounted to 235 million pounds. ^{21/} An estimate is also available from USDA's Statistical Reporting Service (SRS) which, when adjusted for comparability, yields a total production of 234 million pounds for the three States of Pennsylvania, Delaware, and Maryland. ^{22/} The difference between the two estimates amounts to only 1 million pounds or approximately 0.57 percent of the survey estimate. Market utilization based on the grower data was estimated at 117.1 million pounds or 49.86 percent fresh, with the remainder, 50.14 percent, going to processing.

The primary container used by repackers and growers for fresh market sales is the 3-pound basket. Since the sales data obtained from these firms included information on sales in 3-pound baskets, the data could provide another estimate of fresh market sales.

^{21/}The grower population includes growers in Pennsylvania, Delaware, and Maryland. Both total production and total fresh market sales were estimated from the survey, data with an adjustment to include one major growing operation which was not included in the initial grower population.

^{22/} Mushrooms, Crop Reporting Board, SRS, USDA, Wash., DC, August 1981. The daily production pattern of the survey firms was utilized to convert SRS survey data for 1979/80 and 1980/81 to a comparable calendar year.

Pennsylvania
Market Area

Fresh Market
Sales--Repackers

Projected fresh market sales by Pennsylvania repackers amounted to 82.4 million pounds. Sales in 3-pound baskets by the grower population amounted to 44 million pounds. Combined fresh market sales by repackers and by growers in 3-pound baskets amounts to 126.4 million pounds. This compares with the estimated 117.1 million pounds derived from the projection of fresh market sales by the sample growers. The discrepancy in fresh market sales estimates is 9.3 million pounds. The following are some possible sources of this discrepancy:

- The sample grower data underestimate fresh market sales of 117.1 million pounds by growers.
- The sample grower data overestimate sales of 44 million pounds by growers in 3-pound baskets.
- The sample repacker data overestimate fresh market sales of 82.4 million pounds by repackers.
- The sample data from growers and the sample data from repackers yield comparably correct estimates, but repackers are selling a greater amount in the fresh market, and less in the processing market, than is reported to growers.

Most growers, particularly smaller ones, keep only rudimentary sales records, if any. Sales data were obtained from 63 of 96 respondents. Furthermore, in many cases, interviewers were required to summarize daily sales slips for the calendar year to arrive at an annual utilization figure. Previously prepared summaries of sales transactions were available from most larger firms but from less than one-half of the small firms. Unfortunately, growers were not asked to estimate their fresh market sales, which, when compared with the actual sales data obtained from grower records, could provide a check on the reliability of the growers' estimates.

Growers were requested to estimate total production. This individual production estimate was subsequently checked against individual sales data derived from their records. ^{23/} When grower production estimates were checked against total sales data by strata, the correlation was extremely high. Similarly, when the total of the individual production estimates by growers was checked against production estimates derived from their sales data, the correlation was also extremely high. This latter production estimate weighted by strata was utilized to project production for the grower universe. Thus, there is a strong inference that growers can provide a reasonably accurate estimate of total production on the basis of individual experience, limited records, or a combination.

^{23/} The comparison is justified on the assumption that what is produced will be sold; therefore, total sales and total production must be equal.

The discrete nature of the production operation, that is, number of houses, number of fills, number of flushes, pounds per flush, and the like, and the individual grower's production orientation provide a basis for reliable production estimates by growers, even in the absence of records. In contrast, the continuous nature of the marketing operation (that is, daily sales), and the variable distribution between fresh and processing outlets, will severely tax an individual grower's ability to provide an accurate breakdown between fresh and processed sales on an annual basis. In the absence of records, utilization data provided by growers might be questioned. However, the utilization estimates (49.86 percent fresh and 50.14 percent processed) derived in this study from the sample growers' sales records are probably reasonably representative of actual market utilization.

Segmenting the Market

A major thrust of the mushroom industry study was directed at two relatively distinct producing and marketing segments of the complex of firms which constitute the domestic mushroom production sector: PAMDEL, the concentration of mushroom producing firms in southeastern Pennsylvania and adjacent counties in Maryland and Delaware and T-4, the large integrated fresh-market-oriented firms that operate nationally. 24/

Combined production and utilization data for PAMDEL and T-4 by months for the calendar year 1980 are shown in table 27. Total production for both groups amounted to 395.5 million pounds, of which 225.8 million pounds (57.1 percent) were sold fresh. Total U.S. production for the calendar year 1980 was estimated at 470.4 million pounds, of which 300 million pounds were sold fresh. The two groups thus account for 84 percent of total U.S. mushroom production and 75.3 percent of U.S. fresh mushroom sales.

Total U.S. sales to processors were estimated at 170.7 million pounds for the same period. The residual production over fresh-market sales, or sales to processors by the two groups, was estimated at 169.7 million pounds or 99.4 percent of total U.S. sales to processors. These data indicate that those firms not included in the analysis (all other U.S. firms) account for 16 percent of U.S. production, 24.7 percent of U.S. fresh-market sales, and 0.6 percent of U.S. sales to processors.

Total production for PAMDEL firms amounted to 180.2 million pounds, of which 81.3 million pounds (45.1 percent) were sold fresh (table 28). Production by these firms accounted for 38.3 percent of U.S. production (SRS estimates, table 29).

24/ PAMDEL data consists of the production and utilization data generated in the grower survey expanded to the sampling universe and adjusted by removing production and sales attributable to T-4 firms.

Table 27--Total production, fresh and processed mushroom sales, by months, PAMDEL and T-4 market segments combined, calendar year 1980 1/

	Total production	Fresh sales	Processed sales
		Pounds	
JAN.	31,770,809	17,137,288	14,633,521
FEB.	32,665,188	19,074,297	13,590,891
MAR.	41,852,272	24,693,446	17,158,826
APR.	36,962,729	18,502,716	18,460,013
MAY	37,181,437	19,420,993	17,760,444
JUNE	32,525,914	17,730,402	14,795,512
JULY	25,390,692	15,937,546	9,453,146
AUG.	23,404,541	14,784,687	8,619,854
SEPT.	29,606,232	18,214,930	11,391,302
OCT.	31,065,570	18,028,385	13,037,185
NOV.	33,484,669	18,843,573	14,641,096
DEC.	39,551,293	23,403,364	16,147,929
	395,461,346	225,771,627	169,689,719

1/ PAMDEL is the grower universe in Pennsylvania, Maryland, and Delaware for the industry survey and T-4 is the four mushroom production and marketing firms.

Table 28--Total production, fresh and processed mushroom sales, by months, PAMDEL market segment, calendar year 1980 1/

	Total production	Fresh sales	Processed sales
		Pounds	
JAN.	14,469,856	6,141,839	8,328,017
FEB.	15,587,465	7,956,545	7,630,920
MAR.	22,679,061	11,307,587	11,371,474
APR.	18,041,764	6,967,351	11,074,413
MAY	18,488,800	7,333,818	11,154,982
JUNE	13,174,449	5,684,775	7,489,674
JULY	7,602,167	3,735,930	3,866,237
AUG.	7,296,088	3,582,244	3,713,844
SEPT.	11,600,481	5,389,178	6,211,303
OCT.	12,287,612	5,153,411	7,134,201
NOV.	17,213,780	7,338,922	9,874,858
DEC.	21,795,537	10,742,618	11,052,919
	180,237,060	81,334,218	98,902,842

1/ PAMDEL is the grower universe in Pennsylvania, Maryland, and Delaware for the industry study.

Fresh market sales by PAMDEL firms accounted for 27.1 percent of adjusted U.S. fresh market sales and 57.9 percent of adjusted U.S. sales to processors. 25/

Table 29--Total U.S. mushroom production, fresh and processed sales, and percentage in each category accounted for by PAMDEL, T-4, and PAMDEL and T-4 combined, calendar year 1980 1/

U.S. production		PAMDEL	T-4	PAMDEL and T-4
	<u>1,000 lbs.</u>	<u>-----Percent-----</u>		
Fresh sales	299,751	27.1	48.2	75.3
Processed sales	170,686	57.9	41.5	99.9
Total production	<u>470,437</u>	38.3	45.7	84.0

1/ PAMDEL is the grower universe in Pennsylvania, Maryland, and Delaware for the industry survey, and T-4 is the four mushroom production and marketing firms.

Total production for T-4 firms amounted to 215.2 million pounds in calendar year 1980 (table 30). Of this amount, 144.4 million pounds (67.1 percent) were sold fresh and 70.8 million pounds were processed. These firms accounted for 45.7 percent of total U.S. production (SRS estimates), 48.2 percent of adjusted U.S. sales to the fresh market, and 41.5 percent of adjusted U.S. sales to processors (table 29).

Market Utilization Market utilization for PAMDEL firms, T-4 firms, and for both combined, annually and by months, is summarized in table 31. Fresh-market utilization for PAMDEL firms ranges from a high of 51 percent in February to a low of 38.6 percent in April. These data indicate that for PAMDEL firms, the processing market is still the major marketing outlet.

Fresh-market utilization for T-4 firms ranged from a low of 62.2 percent in June to a high of 71.3 percent in December. Assuming that all T-4 firms are endeavoring to maximize sales (total returns) in the fresh market, the utilization pattern evidenced in table 31 suggests the existence of an "unavoidable surplus" created by the interaction of production and marketing forces. Sources of this surplus are production which fails to meet fresh-market quality and short-run increases in fresh market-supplies, decreases in fresh-market demand, or both.

25/This adjustment refers to changes in fresh market utilization as indicated by the industry survey.

SURVEY PRODUCTION AND SALES ANALYSIS

Table 30--Total production, fresh and processed mushroom sales, by months,
T-4 market segment, calendar year 1980 1/

	Total production	Fresh sales	Processed sales
		Pounds	
JAN.	17,300,953	10,995,449	6,305,504
FEB.	17,077,723	11,117,752	5,959,971
MAR.	19,173,211	13,385,859	5,787,352
APR.	18,920,965	11,535,365	7,385,600
MAY	18,692,637	12,087,175	6,605,462
JUNE	19,351,465	12,045,627	7,305,838
JULY	17,788,525	12,201,616	5,586,909
AUG.	16,108,453	11,202,443	4,906,010
SEPT.	18,005,751	12,825,752	5,179,999
OCT.	18,777,958	12,874,974	5,902,984
NOV.	16,270,889	11,504,651	4,766,238
DEC.	17,755,756	12,660,746	5,095,010
	<u>215,224,286</u>	<u>144,437,409</u>	<u>70,786,010</u>

1/ T-4 is a symbol for the four mushroom processing and marketing firms.

Table 31--Fresh-market utilization, PAMDEL and T-4 market segments,
annually and by months, calendar year 1980 1/

	PAMDEL utilization	T-4 utilization	T-4 and PAMDEL utilization
		Percent	
JAN.	42.4	63.6	53.9
FEB.	51.0	65.1	58.4
MAR.	49.9	69.8	59.0
APR.	38.6	61.0	50.0
MAY	39.7	64.7	52.2
JUNE	43.2	62.2	54.5
JULY	49.1	68.6	62.8
AUG.	49.1	69.5	63.2
SEPT.	46.5	71.2	61.5
OCT.	41.9	68.6	58.0
NOV.	42.6	70.1	56.3
DEC.	49.3	71.3	59.2
Annual average	<u>45.1</u>	<u>67.1</u>	<u>57.1</u>

1/ PAMDEL is the grower universe in Pennsylvania, Maryland, and Delaware for the industry survey, and T-4 is the four mushroom producing and marketing firms.

The range in fresh-market utilization suggests a market requirement (surplus) of 30 to 40 percent of production. On the average, every 100 pounds sold in the fresh market will require between 143 and 166 pounds of total production. In more definitive terms, a balanced fresh-market-oriented mushroom industry requires a residual market capable of absorbing between 30 and 40 percent of total production.

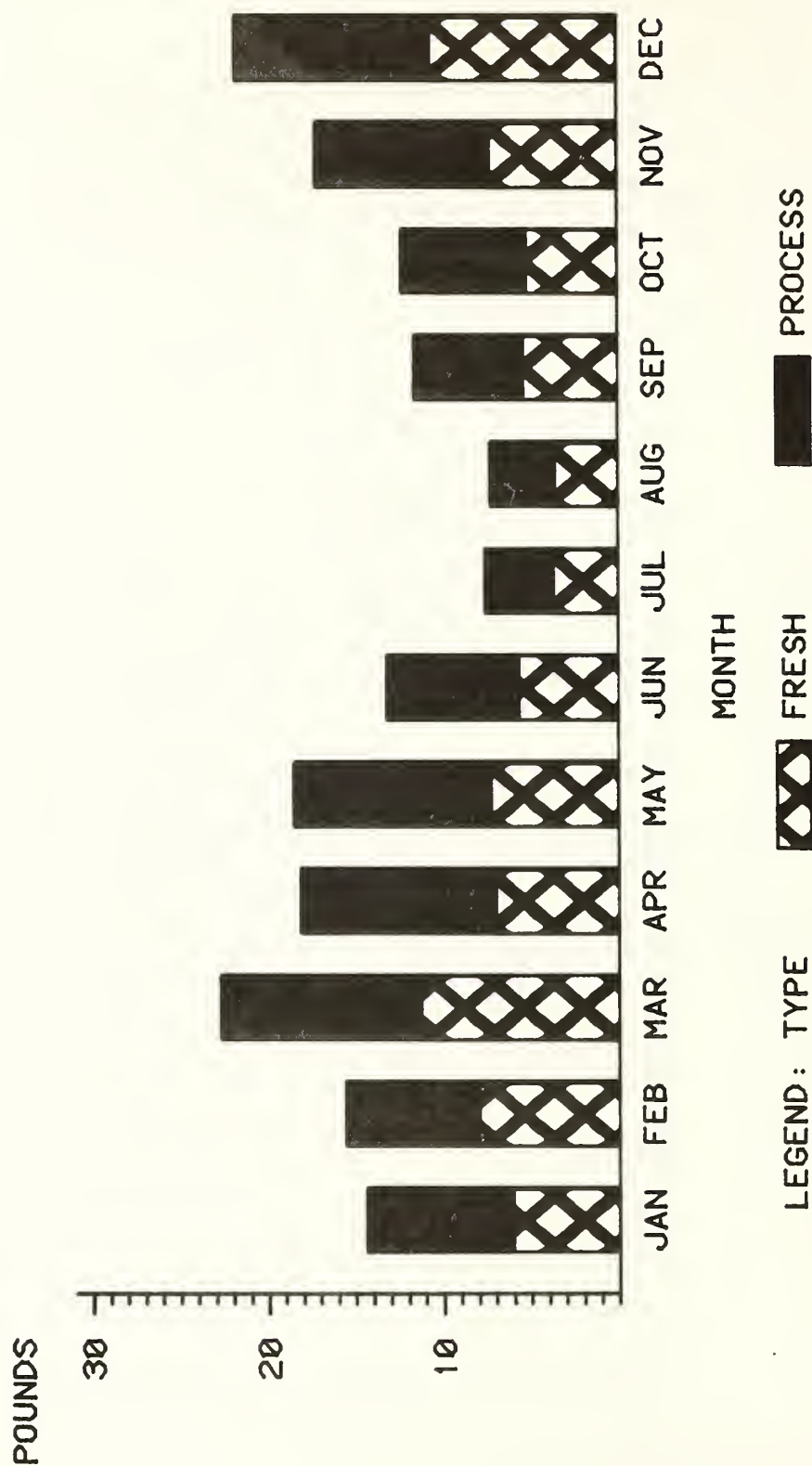
Combined utilization data by months for both PAMDEL and T-4 firms range from a low of 50.0 percent fresh-market utilization in April to a high of 63.2 percent in August. These data indicate that from the point of view of total U.S. production, fresh-market sales constituted the primary outlet for U.S. mushroom producers in all except one month in the 1980 calendar year. A prior determination indicated that combined production, fresh-market sales, and processed sales by PAMDEL and T-4 firms amounted to 84.0 percent of total U.S. production, 75.3 percent of U.S. fresh-market sales, and 99.9 percent of U.S. processed sales. This would imply that "other" U.S. production (16 percent) that is not from PAMDEL and T-4 firms is primarily sold in the fresh market and accounts for 24.7 percent of total U.S. fresh-market sales.

Production and Utilization Patterns

Production and utilization patterns for PAMDEL and T-4 firms are illustrated graphically in figures 15 through 20. Figure 15 illustrates the production pattern of PAMDEL firms, showing peak production in March and low production during July and August. The range between high and low months in this instance is approximately 60 percentage points. For T-4 firms, peak sales were highest in June and lowest in August (figure 16). The difference between high and low sales months was approximately 20 percentage points. A comparison of figure 15 with figure 16 highlights the rather extreme volatility in production for PAMDEL firms and the production stability of T-4 firms. The volatility evidenced by the PAMDEL firms reflects the orientation to the processing market and the traditional fall and spring production pattern. ^{26/} Conversely, the production stability of T-4 firms is indicative of a strong fresh-market orientation and a scheduled year-round production pattern. To the extent that both are competitors and that T-4 firms are latecomers, a comparison of figures 15 and 16 indicates that during the high production month for T-4 firms (June), production for PAMDEL firms was only 58 percent of their highest production month (March) and decreasing. This suggests that the T-4 firms have moved into the market to take up the slack left by PAMDEL firms.

^{26/} Summer production costs are higher, hence processors have traditionally operated during the winter months to take advantage of lower cost production available during this period.

FRESH AND PROCESSING MUSHROOM SALES BY THE PAMDEL FIRMS, 1980



DATA FROM CALENDAR YEAR 1980 MUSHROOM INDUSTRY SURVEY
* DATA IS IN MILLIONS OF POUNDS

Figure 15.--Fresh and processing mushroom sales by the PAMDEL firms, 1980

FRESH AND PROCESSING MUSHROOM SALES BY THE TOP 4 FIRMS, 1980

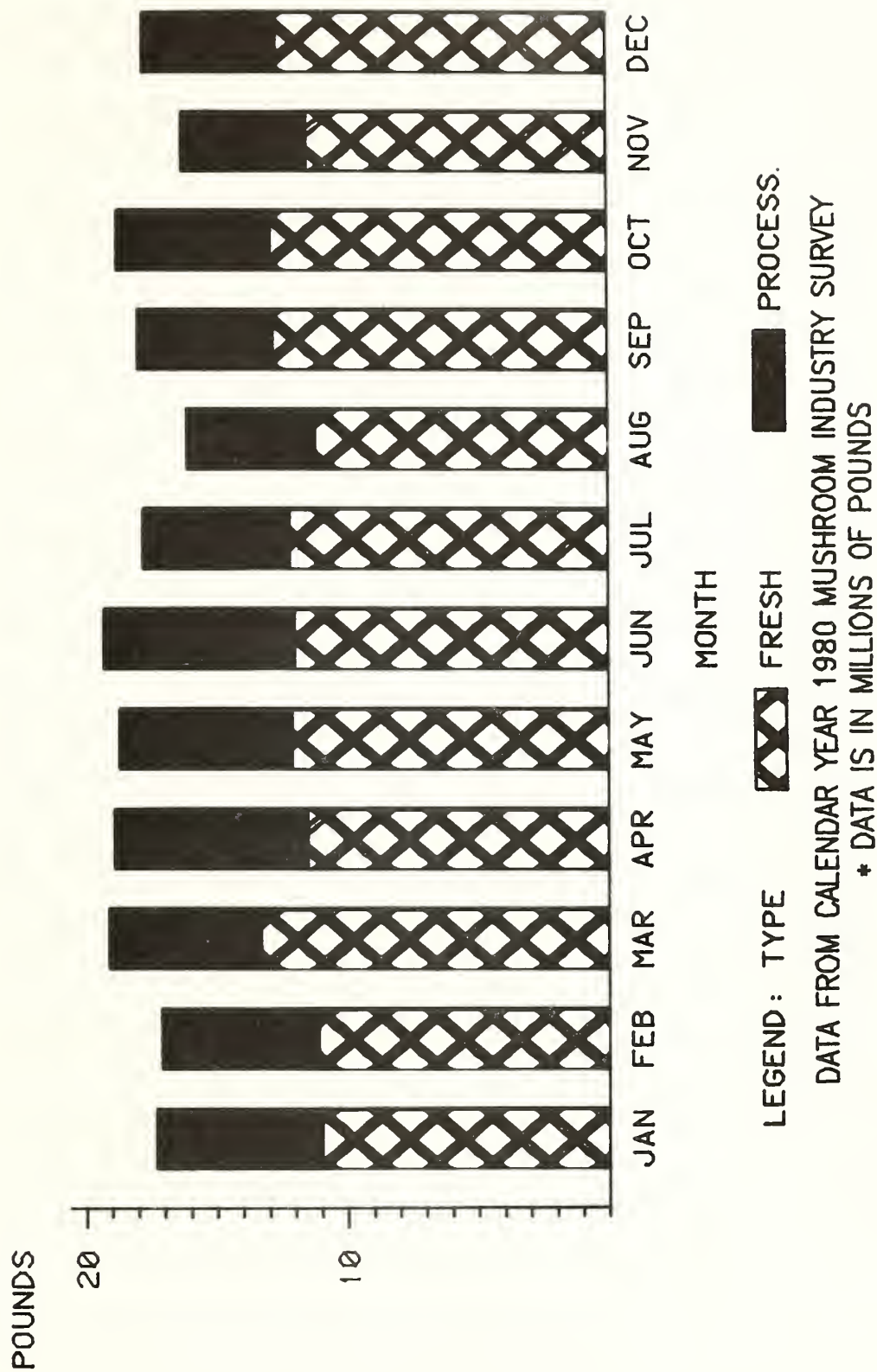
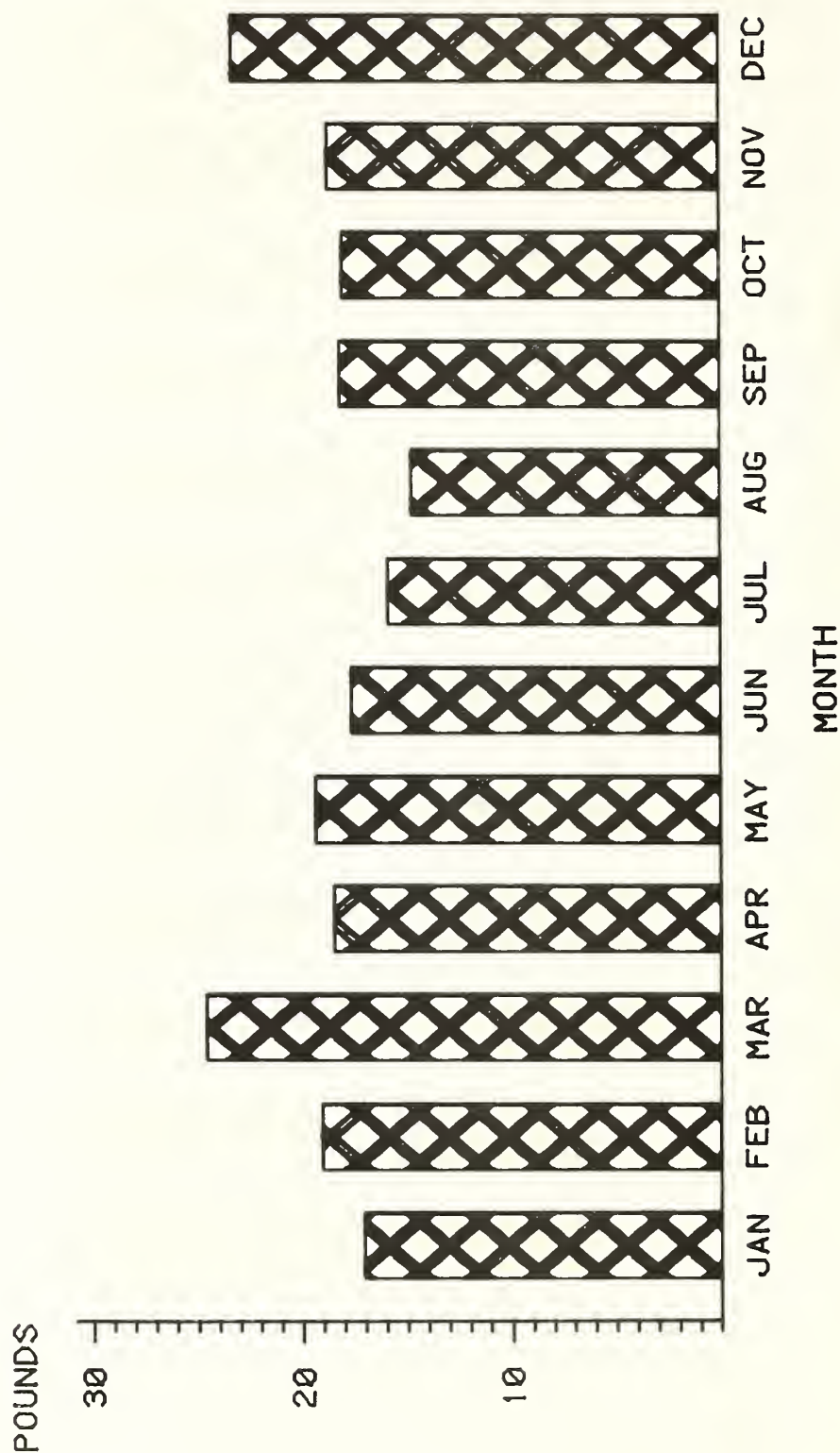


Figure 16.--Fresh and processing mushroom sales by the T-4 firms, 1980

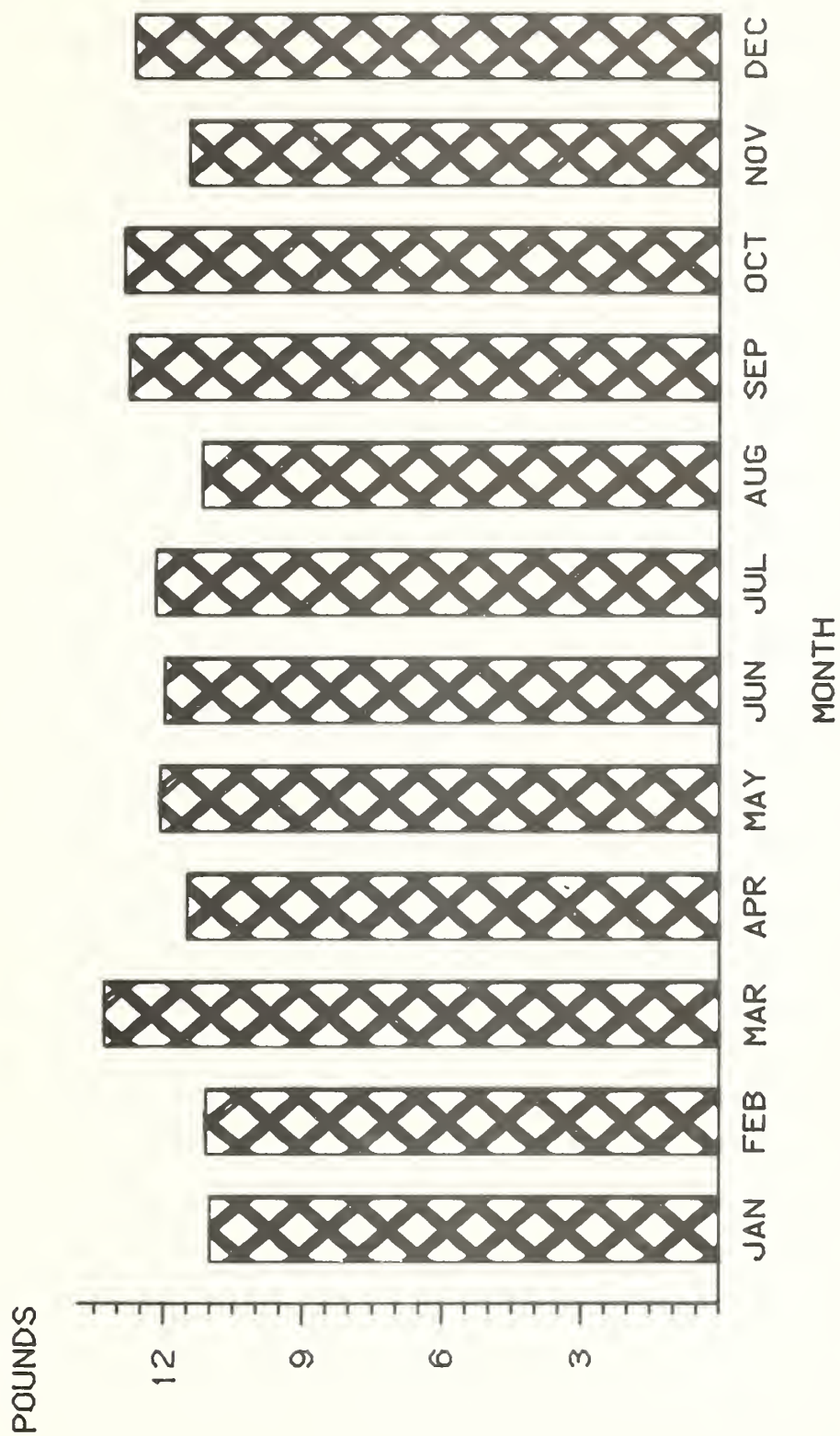
FRESH MUSHROOM SALES BY THE PAMDEL AND THE TOP 4 FIRMS, 1980



DATA FROM CALENDAR YEAR 1980 MUSHROOM INDUSTRY SURVEY
* DATA IS IN MILLIONS OF POUNDS

Figure 17.--Fresh mushroom sales by the PAMDEL and the T-4 firms, 1980

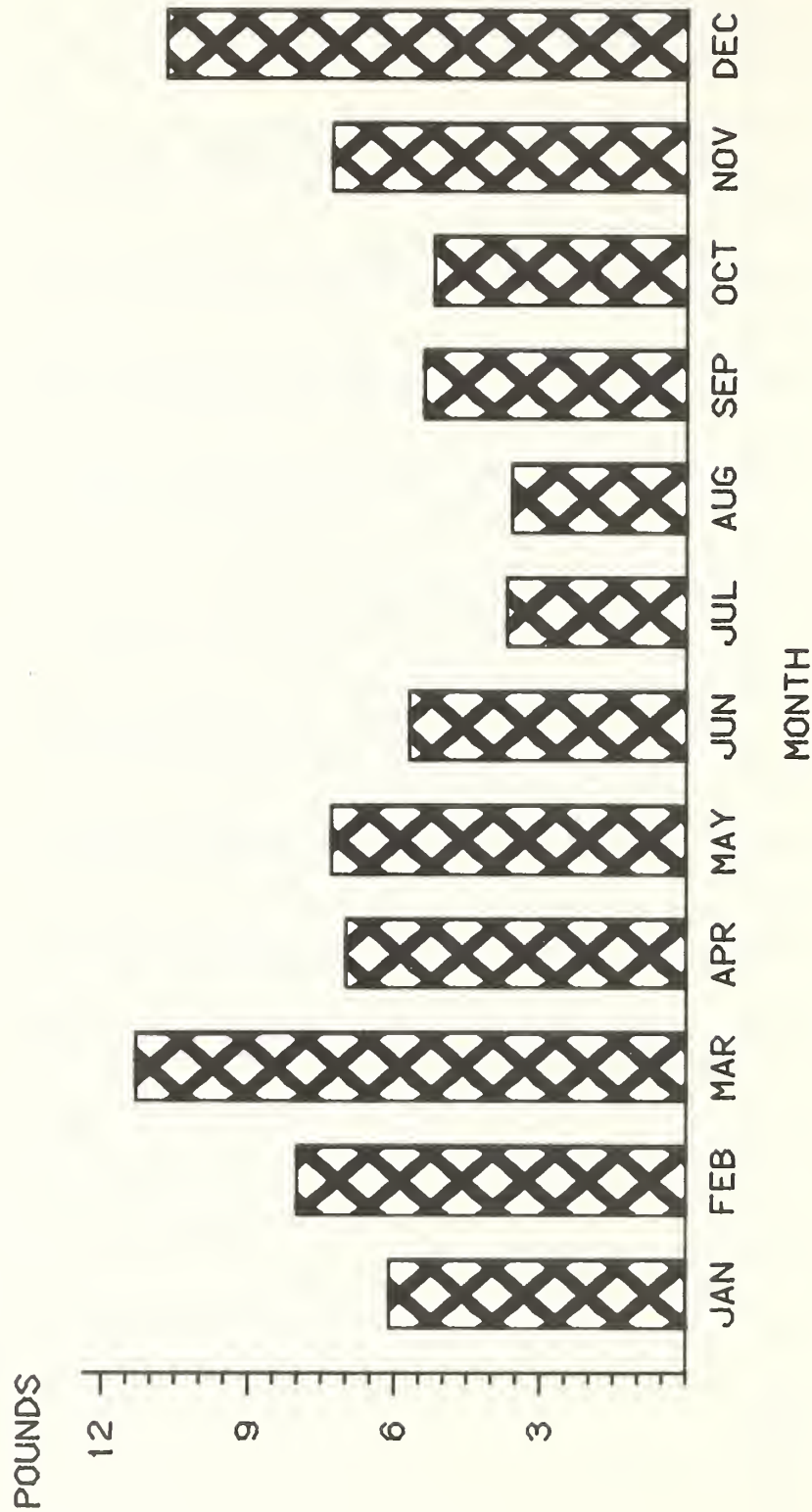
FRESH MUSHROOM SALES BY THE TOP 4 FIRMS, 1980



DATA FROM CALENDAR YEAR 1980 MUSHROOM INDUSTRY SURVEY
* DATA IS IN MILLIONS OF POUNDS

Figure 18.--Fresh mushroom sales by the T-4 firms, 1980

FRESH MUSHROOM SALES BY THE PAMDEL FIRMS, 1980



DATA FROM CALENDAR YEAR 1980 MUSHROOM INDUSTRY SURVEY
* DATA IS IN MILLIONS OF POUNDS

Figure 19.--Fresh mushroom sales by the PAMDEL firms, 1980

Figure 17 illustrates that fresh-market sales for the combined groups peaked in March. This was also true for each group (figures 18 and 19). December was the second highest month with fresh sales equivalent to 95 percent of the March level. Fresh-market sales for the two groups were lowest in August, when they were 60 percent of the peak months.

Fresh-market sales for PAMDEL firms were lowest in August, 32 percent of peak month sales (fig. 19). Fresh-market sales for T-4 firms were markedly stable, with a range of less than 20 percent between the highest and lowest fresh sales months. The months during which sales were lowest were January, February and August. The high sales months, with the exception of the peak sales month of March, showed little month-to-month variation.

Sales to processors by both groups combined exhibit a bimodal pattern, peaking in April and again in December (fig. 20).

Marketings by PAMDEL firms

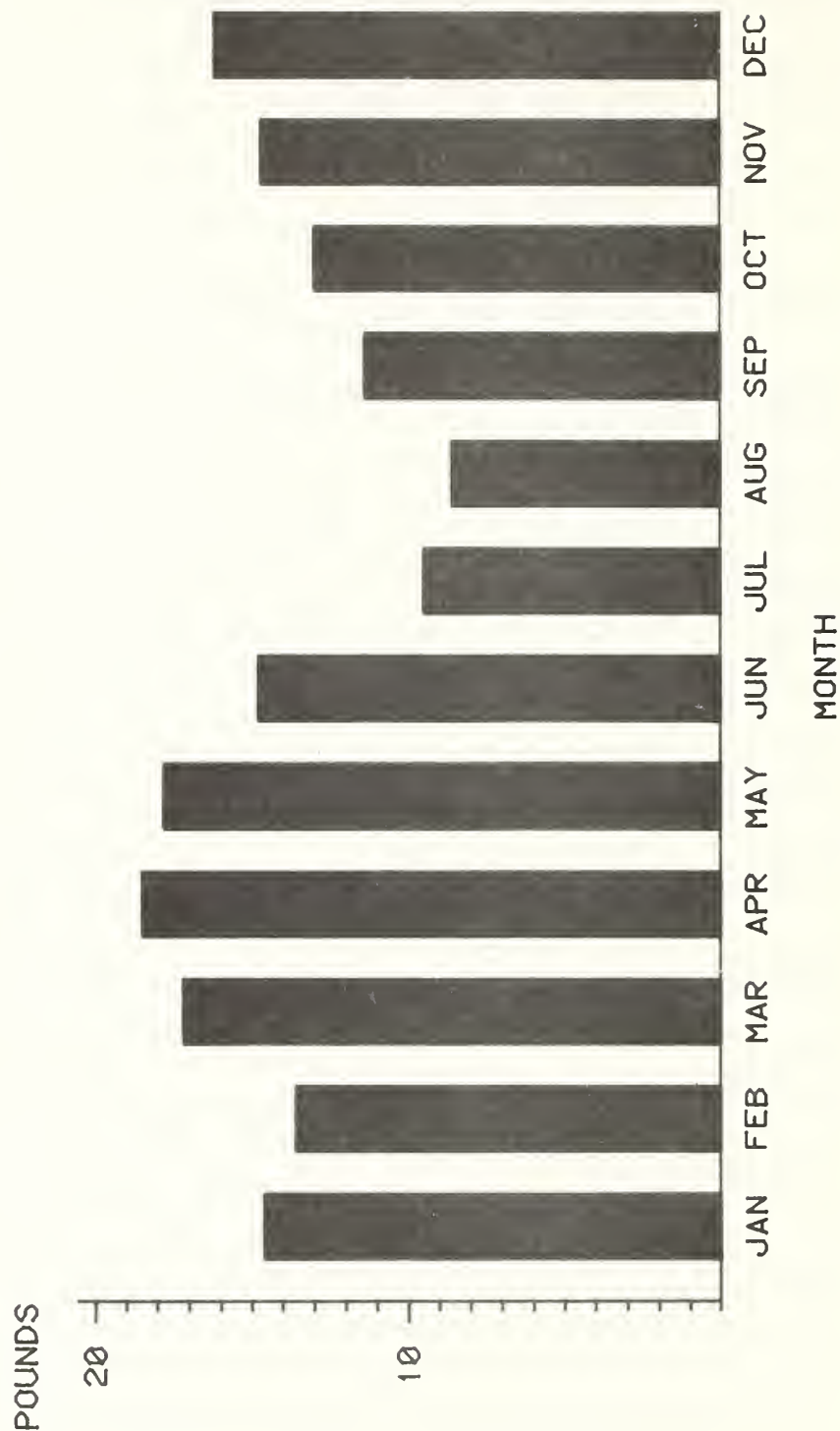
Shipments from Pennsylvania, Maryland, and Delaware marketing firms were estimated from data obtained from the survey of repackers, bulk sales firms, and T-4 firms located in the area. The pattern of fresh-market shipments from these PAMDEL area firms is illustrated in figure 21. Estimated shipments from PAMDEL firms ranged from 90 to 96 million pounds.

Per Capita Consumption

Per capita consumption for any given geographic region is difficult to estimate, since the determination requires estimates of both local production and adjustments for other receipts and shipments to arrive at the net consumption for the area. The determination is further complicated by sales to market intermediaries, such as local wholesale produce firms and chains, where ultimate consumption may occur outside the region.

Despite these problems, an effort was made to estimate per capita consumption of fresh mushrooms in an area which was considered the natural fresh market for eastern and northeastern U.S. mushroom production. The marketing area was defined broadly as the New England, Middle Atlantic, and East North Central States (figure 22). Population in the specified area was 103.6 million (1980 census). An adjustment of production and sales for the area indicated a fresh mushroom consumption of approximately 150.5 million pounds. Accordingly, estimated per capita consumption of fresh mushrooms for the area was 1.45 pounds in 1980.

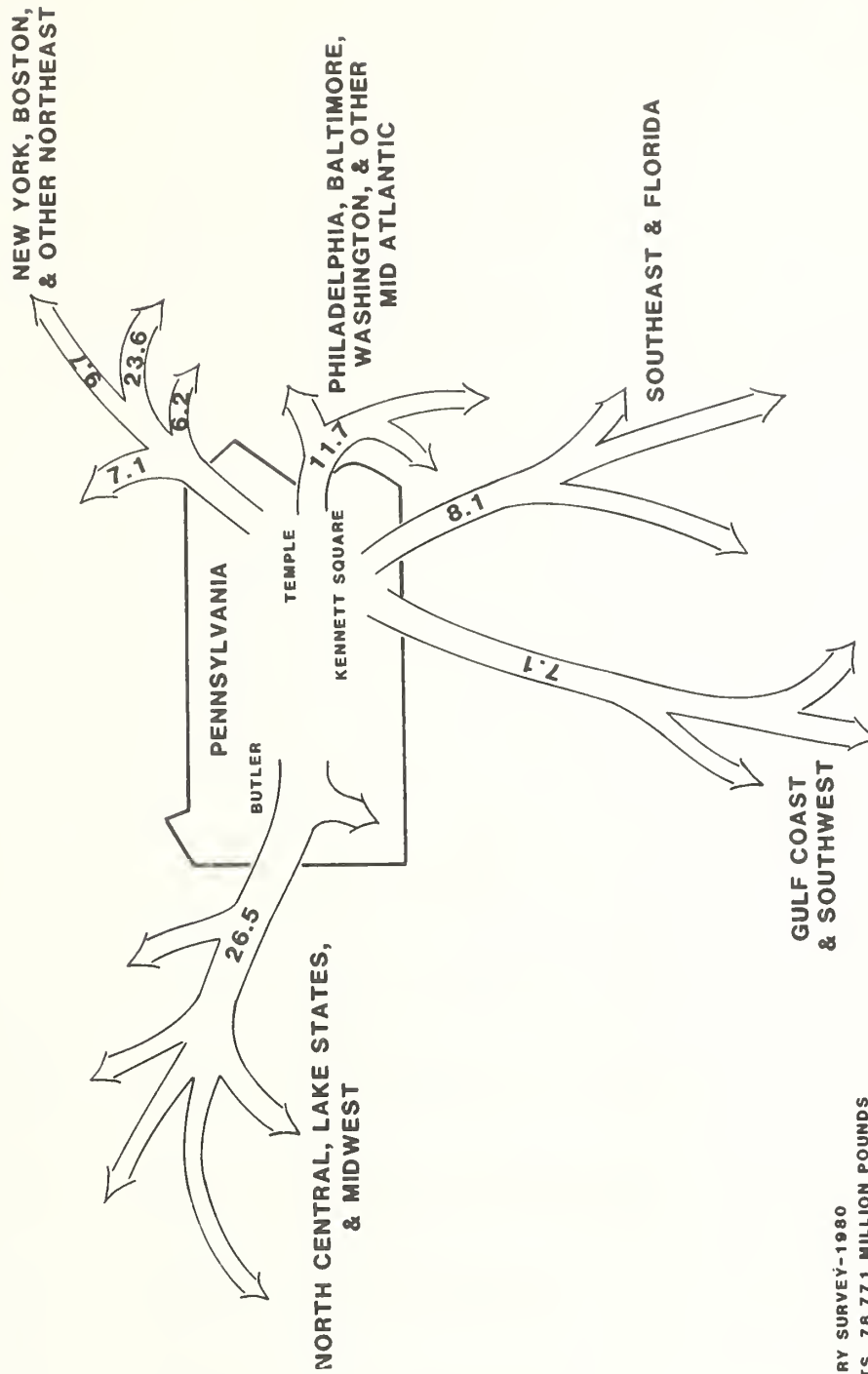
PROCESSING MUSHROOM SALES BY THE PAMDEL AND THE TOP 4 FIRMS, 1980



DATA FROM CALENDAR YEAR 1980 MUSHROOM INDUSTRY SURVEY
* DATA IS IN MILLIONS OF POUNDS

Figure 20.--Processing mushroom sales by the PAMDEL and the T-4 firms, 1980

FRESH MUSHROOM SHIPMENTS-PENNSYLVANIA FRESH MARKET SALES



SOURCE: MUSHROOM INDUSTRY SURVEY-1980
 TOTAL ESTIMATED SHIPMENTS 78.771 MILLION POUNDS
 FIGURES INDICATE % SHIPPED-APPROXIMATE DESTINATION

Figure 21.--Fresh mushroom shipments--Pennsylvania fresh market sales

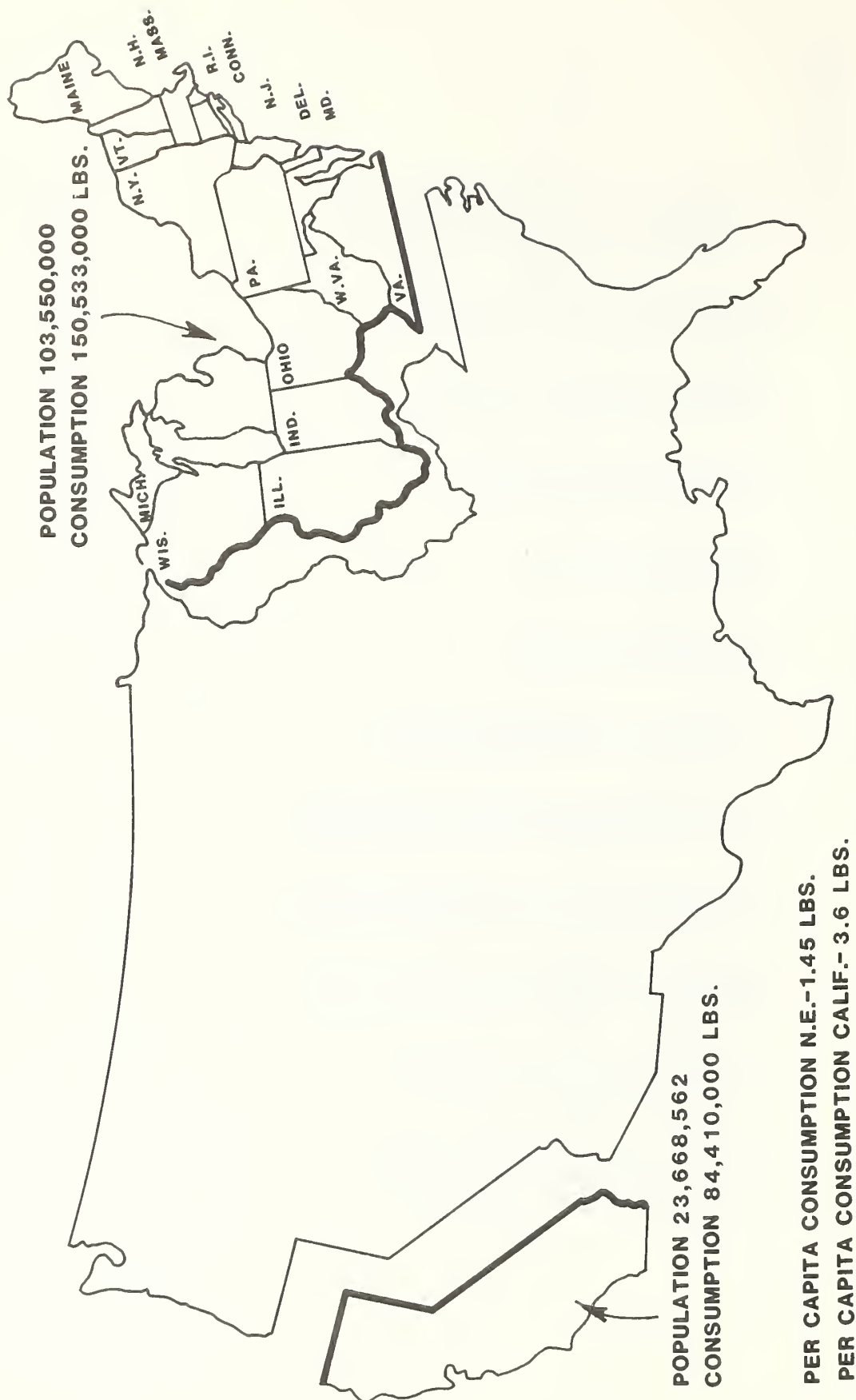


Figure 22.--Estimated per capita consumption for fresh mushrooms in the eastern and northeastern United States and California, 1980

Per capita fresh mushroom consumption for the California market was 3.6 pounds, based on SRS production and other sales data. 27/ California consumption thus exceeded that of the East, Mid-Atlantic and East North Central areas by 2.15 pounds per capita.

Prices and Pricing

Information Available

The Pennsylvania Department of Agriculture, through the State Bureau of Markets, publishes a weekly market newsletter, Mushroom Market News. It reports bulk price information obtained from a survey of major growers and repackers in the Kennett Square and Temple area, with no indication of market quantities moving at the quoted prices.

Wholesale market prices for mushrooms are available through USDA's Agricultural Marketing Service's, fruit and vegetable reports, and in the Mushroom Market News for Philadelphia and New York. Prices paid are reported for 4-quart baskets (3 pounds), 10-pound cartons, and for 8-, 10-, and 12-ounce film-wrapped packages in flat trays, without information on quantities sold.

An effort was made to correlate average weekly prices for both fresh and processed mushrooms obtained from the Mushroom Market News with weekly marketings of fresh and processed mushrooms obtained from the mushroom industry survey. Prices were lagged successively from one through eight periods in an effort to improve the correlations. Results in all cases were inconclusive. Since mushroom sales data were limited to the calendar year 1980, it is possible that the analysis was constrained by specific and perhaps unique price-quantity relationships existing that year. Examination of the data indicates that fresh market prices were highly stable over the period, ranging from \$0.62 to \$0.71 with a maximum difference of \$0.09 per pound between the high and low fresh price. On the other hand, the reported processing mushroom prices ranged from \$0.46 to \$0.64 per pound, a difference of \$0.18. The difference between fresh and processing prices was also highly variable, ranging from \$0.03 to \$0.25 per pound.

Field Prices

At any given time, buyers and sellers recognize a field price for both fresh and processing mushrooms, the apparent basis of most sales negotiations. There are a variety of factors that determine price. Import competition undoubtedly imposes an upper limit on prices paid by canners for processing stock,

27/ Without considering interstate commerce, 3.6 pounds is derived by dividing the total 1980 California mushroom sales (approximately 84.4 million pounds) by the 1980 population census (approximately 23.7 million).

since they will incur losses at higher prices. The determination of lower limits on processing mushroom prices is more complex, since it involves prices paid for fresh mushrooms and fresh mushroom utilization. In the long run, growers will continue to produce and sell mushrooms to processors as long as the cost of producing mushrooms is less than the income fresh and processed mushrooms generate.

Theoretically, in competitive markets, price is determined by the interaction of the forces of demand and supply. This is always true in analysis after the fact. In practice, however, price-making is dynamic and current prices reflect buyers' and sellers' perceptions, which may be at odds with actual supply and demand parameters. ^{28/} Since buyers and sellers are acting on the basis of these perceptions, negotiated prices may not reflect actual supply and demand for the commodity. Therefore, there is no concrete formula for determining the price of mushrooms.

Fresh Mushroom
Prices and
"Thin" Markets

Commission merchants (consignment sales) in the New York produce market are minor sales outlets for PAMDEL fresh mushrooms. Industry sources reported they are considered the least desirable of all fresh market outlets.

Relatively large day-to-day fluctuations in price are common, since grower consignments (supply) alternatively exceed or fall short of buyers' needs (demand). The relatively short shelf life of fresh mushrooms requires that all consignments are sold on the day received. Thus, supply on a given day is inelastic. Mushroom receipts in excess of buyers' needs can be marketed only at disproportionately lower prices. Consequently, the average price for all consignment mushrooms falls if buyers become aware of the available surplus supply and lack of competition for sales.

The New York terminal market price for consignment mushrooms is also the basis for prices paid PAMDEL growers for fresh mushrooms by netmen, a much more substantial outlet for fresh mushrooms. Deviations from the New York price by netmen are based on their estimates of available fresh mushroom supplies and customer requirements.

The price-bargaining process is simplified in the PAMDEL area by the relatively open-ended fresh mushroom supply situation; at any given time a small price premium can result in an increase in the quantity of fresh mushrooms by shifting supplies from processing to fresh utilization.

^{28/} It has also been suggested that "thin" markets, involving few buyers and sellers and a relatively small fraction of total marketable supplies, are easily subject to manipulation by one or more traders.

Repackers provide growers greater assurance of market access through the establishment of a continuing informal buyer-seller relationship. Repackers bargain with growers for total production and pay according to utilization. Sales negotiation (bargaining) is simplified once a relationship is established that continues until dissolved by either party. Grower marketing problems are simplified because production in excess of fresh market requirements or which does not meet fresh market quality is also sold by the repackers.

Prices paid by repackers are based on available mushroom supply and known requirements (repackers' projected sales). They may be adjusted to provide a premium to attract quality growers. Growers in this context are defined as fresh-market oriented, producing quality mushrooms on stable production schedule. Since prices paid by competing buyers--commission merchants and netmen--are readily discernable, price offers by repackers need only exceed competitors' prices by some minimum margin to obtain the required supply of fresh mushrooms. Over time, competing repackers will carve out individual shares in the normal market supply, meeting customers' requirements. As an individual repacker's sales increase, additional growers (suppliers) may be taken on from the pool of growers selling to processors, commission firms, or netmen. Price levels need not necessarily be raised to attract these new suppliers since nonprice factors, such as assured market, fresh market utilization, and similar issues may be sufficient.

The fact that the New York market average consignment price ultimately forms the basis for all price negotiations is a cause for concern. Available evidence from this study suggests that it is based on a very small portion of fresh mushroom sales, resulting in a "thin" market situation that could be highly susceptible to price manipulation. Thin markets occur when there are few negotiated trades in a specified market and time period, and the level of market performance is such that there is a corresponding price sensitivity to incremental "buy or sell" orders. Thin market prices, which are utilized in other price bargaining situations, could result in grower prices that do not represent the existing supply-demand situation.

INDUSTRY AND GOVERNMENT OPTIONS

Introduction

This section of the mushroom industry study has been developed to facilitate discussion among representatives of the various industry sectors, and between industry and government representatives. The Agricultural Marketing Service (AMS) can suggest but not enforce certain courses of action for other Government agencies. Similarly, AMS has the same responsibilities and restrictions when relating to industry.

Industry Options

Product Promotion

The mushroom industry study suggests that the future of the domestic mushroom industry rests, for the most part, in an expansion of the market for fresh mushrooms. Domestic mushroom canners are not likely to compete with foreign canners in price. The study also identified a current lack of fresh mushroom merchandising effort by those growing and marketing firms most affected by the increase in canned mushroom imports (that is, the PAMDEL firms). The development of an industry promotion program has potential benefit for increasing market share and per capita consumption of fresh mushrooms.

Product promotion requires industry cooperation, with specific procedures for financing the programs and determining the audience and geographic scope. An industry promotional program can be either voluntary or involuntary. A voluntary program is one in which firms are assessed on some equitable basis for costs incurred by the program. The major disadvantage of a voluntary program is that it is generally plagued by individuals or firms who benefit from the program, but who fail to pay their assessments. Voluntary programs often fail because of an inability to raise sufficient continuous operating funds.

Involuntary programs are those financed under Federal or State legislation that provides the legal framework and enforcement power to the industry to collect assessments and carry out specific program objectives. State legislation is limited in its enforcement power because the industry may be spread across several States. Federal legislation appears to be the more viable option.

Although an involuntary program is coercive to the extent that it requires all industry members to be subject to the order, Federal legislation is democratic, requiring an affirmative vote in a referendum by two-thirds of the qualified producers of the commodity or by producers who have produced for market at least two-thirds of the volume within the production area specified. A Federal marketing order may be limited to promotion or it may include other regulatory aspects designed to promote orderly marketing.

Under current Federal marketing order legislation, a program could provide for assessing growers to finance production and market research and development for domestic fresh mushrooms only. Under existing legislation, however, the promotion program would exclude paid advertising. A broader Federal marketing order program to include processing mushrooms and to provide for paid advertising would require an amendment to the Agricultural Marketing Agreement Act. There is rather general

agreement that the act could not be amended to include imports.

An alternative to a Federal marketing order program is specific "free standing" legislation to authorize the establishment of a promotion and research program for mushrooms similar to the statutes in effect for cotton, potatoes, eggs, and floral products. This legislation could include all mushrooms, domestic and imported.

Under the Agricultural Marketing Agreement Act, there is no provision for growers who do not wish to be subject to assessments. However, as a matter of policy, Congress has included a refund provision in all currently operative free-standing legislation.

A marketing order under current legislation has the distinct advantage of speedy implementation. Its main disadvantages are that paid advertising is not permitted for processed mushrooms and would be restricted to fresh mushrooms. These restrictions reduce the potential assessment base. An order limited to the PAMDEL area would have a potential assessment base of approximately 120 million pounds of mushrooms, which would generate an income of \$1.2 million annually if assessed at the rate of \$0.01 per pound. ^{29/} The industry needs to consider seriously the level of funds that can be used most efficiently, at least in the initial phases of a promotion program. It also must consider whether the large assessment base and the revenues projected for a program including fresh and processed mushrooms under amended legislation would be worth the time spent in getting it implemented.

A promotion program authorized by an amendment to the Agricultural Marketing Agreement Act to include processing mushrooms and paid advertising would generate substantial revenues and would be more flexible in operation. The main obstacle is securing the necessary legislation. If limited to the PAMDEL area, the assessment base would be approximately 234 million pounds, which, at an assessment rate of 1 cent per pound, would generate \$2.3 million annually. In considering this option, the industry must decide whether the inclusion of processing mushrooms in the assessment base would also necessarily require the expenditure of promotional funds on processed mushrooms. This would place the domestic growers in the undesirable position of promoting sales for imported canned mushrooms, since imports make up roughly 50 percent of the U.S. canned mushroom market.

^{29/} The \$.01 per pound rate is arbitrarily selected to quantify the revenue potential of a given option. A larger or smaller rate may be more acceptable to the industry.

The "free standing" legislation for promotion option is the most flexible and has the potential of generating the greatest revenue among all the alternatives. It could include fresh mushrooms, processed mushrooms, and canned mushroom imports in the assessment base. Potential revenues, assuming an assessment base calculated in fresh mushroom equivalents, would amount to approximately \$6.2 million annually at the 1-cent-per-pound assessment rate. There would, of course, be no geographical limitation to the application of the legislation. Securing the necessary enabling legislation, including the time required for Congressional consideration, is a major problem. An additional obstacle is the magnitude of the educational program required to secure industry approval. A successful extension of the promotion program to all areas of the country, to include all fresh and processed mushrooms, including imports, necessarily implies a reconciliation of conflicting interests. Full support by all industry groups is needed to get the program adopted.

Market Access and Equity

The initiative for any course of action in the produce promotion area rests entirely with the industry. USDA can supply background information on procedures to be followed in implementing current legislation. Responsibility for changes in legislation or for new legislation rests solely with the industry.

The situation in the PAMDEL area can be characterized as one of disorderly marketing. It results from producers' efforts to obtain a share of the more profitable fresh market as profitable processing opportunities decline. An expansion in the demand for the fresh product will reduce some of the pressure on existing producing and marketing firms to share fresh-market opportunities; however, it will not entirely eliminate the problem until all producers have access to the fresh market. Expansion in the demand for the fresh product may not result in the shortrun enhancement of fresh-market prices because buyers of a fresh product face an elastic supply curve, which means that they can obtain additional supplies of a fresh product without increasing prices appreciably. This situation will persist until fresh-market demand has been expanded sufficiently to absorb all growers' production capacity less any remaining processing demand.

Market access is complex, since a solution necessarily involves deeply held values of equity (fairness) and economic freedom. The industry should consider two possible options as a means to ameliorate the market access and equity problem: the regulatory aspects of the Federal order program and/or the development of a producer bargaining association(s).

The major question posed is whether a Federal order could be framed that would contribute to a solution of the market access

and equity problem and be both politically and economically feasible. A regulatory order must be acceptable to the industry, and would conceivably involve some pooling of sales to provide for an equitable distribution of fresh market sales. Accounting to principals on the basis of pool prices is a recognized, legitimate, accounting practice throughout the produce industry when there is prior agreement between the parties.

It is the shortrun aspect, a situation where some participants cannot be made better off without making other participants worse off, that may prevent acceptance. There is a consensus that pooling can be permitted only by amending existing legislation. 30/

The development of a producer bargaining association is considered an alternative to a Federal regulatory order. Both measures seek the same objectives, that is, improved market access and an equitable distribution of fresh market sales. The study identified an imbalance in market power in favor of mushroom buyers. Development of an effective producer bargaining association(s) could serve to remedy this imbalance. Failure on the part of buyers to bargain collectively with the association could lead to efforts by the association to expand into repacking and other assembly and sales functions. It could be difficult, given the existing structure of the industry, for a bargaining association to obtain bargaining rights for enough production to effectively influence prices.

Slow-Pay
Problem/Solution

The study identified slow-pay by buyers as a major problem in the PAMDEL sector of the mushroom industry. The problem is pervasive in both processing and fresh market sectors. It is not illegal under the Perishable Agricultural Commodities Act since growers or other market participants are allowed to make any agreement with purchasers, either oral or written, as to the length of the payment period. If the parties do not specify the time that payment is due at the time the contract is made, the time periods established by regulation for the various types of contractual relationships apply (PACA regulations section 46.2(aa)). The problem persists due to the imbalance in market power between buyers and sellers. Growers (sellers) lack alternative markets which preclude them from insisting on prompt payment from buyers. The development

30/ The basic legislation is so broadly written that an innovative approach to equitable sharing in fresh-market sales on the part of all producers, with provision for equitable sharing of the surplus, may well be legally feasible. See particularly sections (6) (B) and (6) (E), Agricultural Marketing Agreement Act of 1937, as amended. This possibility deserves some consideration by the industry.

and adoption of a standard sales contract would not improve the situation since sellers (growers) lack power to force its acceptance. At best, a standard sales contract acceptable to buyers would only institutionalize the existing length of the payment period.

Existing Federal order legislation does not address itself specifically to the "slow pay" problem. It prohibits unfair methods of competition and unfair trade practices in handling regulated commodities (Section (7) A, Agricultural Marketing Agreement Act). "Slow-pay" is an unfair trade practice to the extent that buyers can discriminate between sellers. 31/

A producer bargaining association could conceivably force the adoption of a standard sales contract with appropriate payment terms acceptable to sellers (growers). Organizational activity by growers is protected under the Agricultural Fair Practices Act, which prohibits handlers from coercing, refusing to deal with, intimidating, or conspiring with others for the same purposes against producers to inhibit or restrain organizational activity. 32/

Grades and Grading

The study identified considerable dissatisfaction among growers with grading practices. This is to be expected in a system where the buyer assigns grades that the seller must accept or subsequently seek other outlets. Increased emphasis on fresh-market sales necessarily places a greater emphasis on grades and grading practices. A Federal marketing order could provide for product inspection and the independent assignment of grades. A marketing order also could provide for better application of industrywide grading standards.

Government Options

Import Restrictions

Current governmental attitudes and philosophy limit the types of assistance the mushroom industry might ask the Government to help provide. Government attitudes toward free trade with the major canned-mushroom-exporting countries in conjunction with the agricultural trade imbalance in favor of the United States probably precludes any significant extension of the current tariff on imported canned mushrooms. Industry self-help efforts over the next few months may, in fact, be crucial in influencing the U.S. International Trade Commission (USITC) to

31/ In practice, enforcement of marketing order provisions dealing with unfair methods of competition and unfair trade practices has been relatively unsuccessful.

32/ Although the Agricultural Fair Practices Act specifically prohibits coercive activity, enforcement is difficult due to the problems encountered in proving that the offense occurred.

retain the remedial tariff schedule for the full 3-year period. The 18-month USITC review of the remedial tariff is scheduled for completion in May 1982.

Mushroom industry assistance based on import restrictions is considered applicable only in the short run. It is a means of buying additional time until the appropriate industry adjustments can be made and the transition to the fresh or primary market is completed. There is considerable doubt whether the current tariff level (3.2 cents per pound plus 25 percent ad valorem) will provide sufficient protection during the transition period. The following shortrun import relief measures are Government options only to the extent that they involve considerable governmental discretion and a direct Government role in implementation. They are not, however, self-triggering; they will require industry initiative. The major questions raised for consideration are:

- What changes in the current import relief program are desirable at this time?
- What changes are feasible under current legislation that could be supported by the current Administration, and how soon could they be implemented?
- What type of commitment should be sought from the Government if a change in the current program appears desirable?
- How and when should the mushroom industry proceed in initiating desired changes?

The shift in the relative importance in the U.S. market of the major exporting countries deserves some consideration. This study indicates increasing levels of imports from China and Hong Kong and decreasing levels of imports from Taiwan and South Korea. The rationale for selecting an enhanced tariff on imported canned mushrooms, as opposed to the USITC quota recommendation, has been considerably weakened over the last 12 months. A quota system that takes into consideration these new economic conditions may be more acceptable to U.S. trading partners than the current enhanced tariff levels. This option should be examined in the event the USITC investigation permits consideration of alternative remedies to the enhanced tariff.

Section 203 (d) (2) of the Trade Adjustment Act of 1974 authorizes the President to negotiate orderly marketing agreements with foreign countries. Consideration might be given to this option since it could conceivably entail negotiated quotas with exporting countries and the suspension of the current tariff relief measure. A system of orderly marketing agreements with exporting countries may be more palatable to these countries than either a U.S.-imposed tariff or quota system.

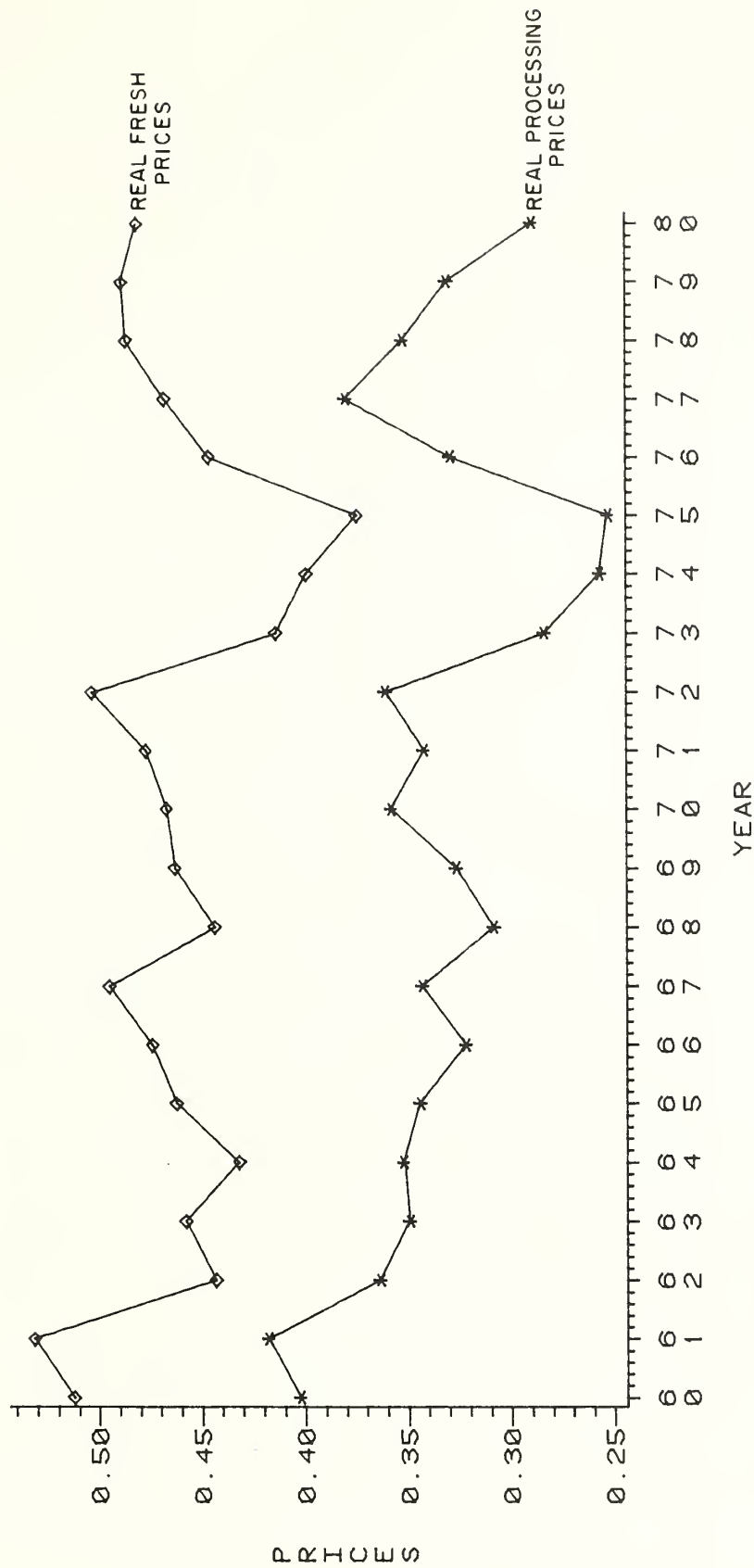
The increase in the level of imports from China and Hong Kong over the last year constitutes a major change in relative shares of the U.S. canned mushroom market held by the exporting countries. Some leverage would appear to be available to limit imports from China under Section 406, Market Disruption, Trade Adjustment Act of 1974. This section of the act applies solely to imports from Communist countries, with the potential relief measure tailored specifically to China.

Other Government
Assistance

Current mushroom production in the PAMDEL area is in excess of fresh market requirements; consequently, financial assistance for construction of new production facilities and/or the entry of new growers would appear to exacerbate the current problem. The industry analysis indicated a high degree of seasonality in production by PAMDEL growers with many growers operating only during the fall through spring period. A shift to a fresh market emphasis will undoubtedly require reasonably stable year-round production to effectively establish buyer relationships and satisfy market demand. This will necessitate modernization of current facilities by the addition of air-handling facilities. The Farmers Home Administration (FmHA) supervises loan programs and the Small Business Administration (SBA) could be utilized to finance these improvements. The mushroom industry should attempt to secure a commitment from FmHA to consider loan applications for this purpose. The Office of Trade Adjustment Administration (OTAA) may constitute another source of funds for this purpose.

The Pennsylvania Agricultural Experiment Station has long maintained a well-funded research program in mushroom production. The industry is encouraged to continue its support for this program. The shift in emphasis to fresh-market production suggested by the study may require setting new research priorities and an expansion of the current program into broader market research and extension programs. A similar commitment for research support at the Federal level might be effected through the Agricultural Research Service of USDA. The Agricultural Marketing Service, USDA, maintains a program of research on marketing facilities and product-handling in the marketing channel which could provide assistance in researching specific problems within this area. The Federal-State Marketing Improvement Program, administered by AMS, constitutes a potential source of funds for innovative types of market studies and pilot projects. Finally, the Agricultural Cooperative Service performs economic feasibility studies for farmers interested in farming cooperatives.

REAL FRESH AND PROCESSING MUSHROOM PRICES FOR CROP YEARS 1960 TO 1980^{1/}



^{1/} REAL PRICES OF MUSHROOMS ARE DERIVED BY DEFLATING THE NOMINAL PRICES BY THE ALL VEGETABLES CROP INDEX, STATISTICAL REPORTING SERVICE, U.S.D.A.

SOURCE: INTERNATIONAL TRADE COMMISSION AND THE STATISTICAL REPORTING SERVICE, U.S. DEPARTMENT OF AGRICULTURE.

Appendix A, Figure 1.--Real fresh and processing mushroom prices for crop years 1960-80

Table 1--Total U.S. mushroom production and fresh market sales, sales to processors and canners in pounds and as a percentage of total production, 1970/71-1980/81

Crop year	Total U.S. production	Sales, fresh market <u>1/</u>		Sales to processor			
				Canners <u>2/</u>		Other processor	
	Million lbs	Million lbs	Percent/production	Million lbs	Percent/production	Million lbs	Percent/production
70/71	207	58	28.0	113	54.5	36	17.4
71/72	231	66	28.6	137	49.3	28	12.1
72/73	254	77	30.3	121	47.6	56	22.0
73/74	279	102	36.6	106	38.0	71	25.4
74/75	299	126	42.1	112	37.5	61	20.1
75/76	310	142	45.8	104	33.5	64	20.6
76/77	347	151	43.5	156	45.0	40	11.5
77/78	399	191	47.9	146	36.6	62	15.5
78/79	454	228	50.4	139	30.8	85	18.8
79/80	470	256	54.5	146	31.1	68	14.5
80/81	471	<u>3/</u> 267	<u>3/</u> 56.7	<u>3/</u> 153	<u>3/</u> 32.5	<u>3/</u> 51	<u>3/</u> 10.8
Annual compound growth rate	8.6%	16.5%		3.1%		3.5%	

1/ Production and fresh market sales from USDA crop reporting data.

2/ Estimated from USITC data and USDA data on sales to processors, including canners.

3/ These figures do not reflect changes in utilization determined by the survey.

Table 2--U.S. imports of canned mushrooms, total disappearance, total U.S. production, total U.S. sales to processors, and imports as a percentage of total U.S. disappearance, total U.S. mushroom production, and total U.S. sales to processors (fresh weight equivalents), 1970/71-1980/81

Crop year	U.S. imports	Total disappearance 1/	Total U.S. production	Total U.S. sales to processors	Imports as a percent of		
					Total disappearance	Total U.S. production	Total sale
	Million lbs	Million lbs	Million lbs	Million lbs	Percent	Percent	Percent
70/71	43	250	207	149	17.2	20.8	2
71/72	62	293	231	165	21.2	26.8	3
72/73	74	328	254	177	22.6	29.1	4
73/74	70	349	279	177	20.0	25.1	3
74/75	77	376	294	173	20.5	25.8	4
75/76	88	398	310	168	22.0	28.4	5
76/77	108	454	347	196	23.6	30.8	5
77/78	141	540	399	208	26.1	35.3	6
78/79	134	588	454	226	22.8	29.5	5
79/80	174	644	470	214	27.0	37.0	8
80/81	148	619	471	2/ 204	23.9	31.4	2/ 7

1/ Total disappearance includes mushrooms from all sources and equates to total sales.

2/ These figures do not reflect changes in utilization determined by the survey.

Table 3--U.S. mushroom sales, fresh and processed, and per capita disappearance, 1970/71-1980/81 1/

Crop year	Fresh sales		Processed sales		Total sales <u>2/</u>	
	Million lbs	Lbs/ capita	Million lbs	Lbs/ capita	Million lbs	Lbs/ capita
70/71	58	.29	192	.95	250	1.24
71/72	66	.32	227	1.10	293	1.42
72/73	77	.37	251	1.20	328	1.57
73/74	102	.48	247	1.17	349	1.65
74/75	126	.59	250	1.17	376	1.76
75/76	142	.66	256	1.19	398	1.85
76/77	151	.69	303	1.39	454	2.08
77/78	191	.87	349	1.59	540	2.46
78/79	228	1.03	360	1.62	588	2.65
79/80	256	1.14	388	1.73	644	2.87
80/81	<u>3/</u> 267	<u>3/</u> 1.18	<u>3/</u> 352	<u>3/</u> 1.55	619	2.73

1/ Processed sales include U.S. sales of fresh mushrooms to processors, including canners, plus fresh-weight equivalent of imported canned mushrooms.

2/ "Total sales" is a measure of total disappearance of domestically produced mushrooms. Total sales per capita are thus a gross measure of per capita consumption as opposed to net measure, i.e., gross sales minus marketing losses.

3/ These figures do not reflect changes in utilization determined by the survey.

Table 4--Domestic prices, fresh and processed mushrooms,
crop years 1959/60-1980/81 1/

Crop year	Fresh mushrooms	Processed mushrooms	Price difference between fresh and processed
59/60	\$0.420	\$0.330	\$0.090
60/61	0.420	0.330	0.090
61/62	0.390	0.320	0.070
62/63	0.380	0.290	0.090
63/64	0.380	0.310	0.070
64/65	0.430	0.320	0.110
65/66	0.479	0.325	0.154
66/67	0.495	0.343	0.152
67/68	0.479	0.333	0.146
68/69	0.491	0.346	0.145
69/70	0.481	0.369	0.112
70/71	0.544	0.390	0.154
71/72	0.579	0.415	0.164
72/73	0.555	0.380	0.175
73/74	0.571	0.367	0.204
74/75	0.607	0.409	0.198
75/76	0.719	0.530	0.189
76/77	0.824	0.669	0.155
77/78	0.901	0.652	0.249
78/79	0.949	0.642	0.307
79/80	0.959	0.576	0.383
80/81	0.918	0.518	0.400

1/Prices are average prices from published reports of the Statistical Reporting Service, USDA, and U.S. International Trade Commission.

Table 5--Average annual real prices of processed and fresh mushrooms, crop years 1959/60-1979/80 1/

Crop years	Processed mushrooms	Fresh mushrooms
59/60	0.402	0.512
60/61	0.418	0.532
61/62	0.364	0.443
62/63	0.349	0.458
63/64	0.352	0.432
64/65	0.344	0.462
65/66	0.322	0.474
66/67	0.343	0.495
67/68	0.308	0.444
68/69	0.326	0.463
69/70	0.358	0.467
70/71	0.342	0.477
71/72	0.361	0.503
72/73	0.284	0.414
73/74	0.257	0.399
74/75	0.252	0.375
75/76	0.329	0.446
76/77	0.380	0.468
77/78	0.352	0.487
78/79	0.331	0.489
79/80	0.290	0.482

1/Real prices of mushrooms are derived by deflating the nominal prices by the All Vegetables Crop Index, Statistical Reporting Service, USDA.

Table 6--U.S. imports from major suppliers and percentage of total imports, 1979/80 and 1981 (January-October)

Month	Taiwan			South Korea			Hong Kong			PRC			Other		
	1,000 lbs	Percent	1,000 lbs	Percent	1,000 lbs	Percent	1,000 lbs	Percent	1,000 lbs	Percent	1,000 lbs	Percent	1,000 lbs	Percent	
1979:															
January	2,731	37.11	2,725	37.02	1,150	15.62	N.A.	N.A.	N.A.	N.A.	542	10.25			
February	1,961	36.11	2,424	44.64	697	12.83	N.A.	N.A.	N.A.	N.A.	189	6.42			
March	3,536	41.21	3,008	35.05	1,724	20.10	23	.26	23	.26	323	3.37			
April	2,564	40.55	2,141	33.85	1,261	19.94	22	.34	22	.34	336	5.32			
May	3,943	49.27	2,615	32.68	1,095	13.69	3	.04	3	.04	347	4.33			
June	5,382	47.07	4,055	35.47	1,722	15.06	N.A.	N.A.	N.A.	N.A.	346	2.41			
July	7,832	61.86	3,599	28.43	845	6.67	N.A.	N.A.	N.A.	N.A.	385	3.04			
August	4,733	51.03	2,973	32.05	1,414	15.25	13	.14	13	.14	142	1.53			
September	5,479	66.96	1,172	14.32	1,223	14.95	2	.03	2	.03	307	3.75			
October	5,255	67.79	1,112	14.34	977	12.60	13	.17	13	.17	395	5.10			
November	4,749	61.68	1,153	14.97	1,341	17.41	132	1.72	132	1.72	325	4.22			
December	2,688	45.54	1,575	26.69	1,107	18.76	57	.97	57	.97	475	8.04			
1980:															
January	3,365	50.46	2,741	41.09	402	6.03	11	.17	11	.17	150	2.25			
February	4,494	51.10	2,812	31.97	1,030	11.71	114	1.29	114	1.29	346	3.93			
March	5,229	52.16	1,756	17.51	1,706	17.02	954	9.25	954	9.25	380	3.79			
April	6,553	52.91	1,812	14.63	2,345	18.94	1,249	10.09	1,249	10.09	425	3.43			
May	7,403	57.76	2,141	16.71	2,422	18.90	320	2.50	320	2.50	529	4.13			
June	3,509	30.65	3,080	26.91	2,740	23.93	1,408	12.30	1,408	12.30	711	6.21			
July	4,748	45.54	2,052	19.68	1,196	18.82	1,104	10.59	1,104	10.59	560	6.37			
August	8,507	64.33	1,088	8.22	1,165	8.81	1,313	9.93	1,313	9.93	1,152	8.71			
September	3,349	49.08	823	12.06	1,769	25.93	718	10.52	718	10.52	164	2.40			
October	4,794	53.65	304	3.41	1,642	18.38	1,932	21.62	1,932	21.62	264	2.95			
November	3,311	39.89	701	8.44	719	8.66	3,190	38.43	3,190	38.43	380	4.58			
December	3,847	51.58	97	1.31	917	12.24	2,517	33.74	2,517	33.74	81	1.09			
1981:															
January	2,572	57.92	61	1.39	1,146	25.80	485	10.93	485	10.93	176	3.96			
February	999	21.71	908	19.73	1,778	38.64	760	16.51	760	16.51	157	3.42			
March	1,235	17.74	1,076	15.46	2,753	39.54	1,375	19.74	1,375	19.74	524	7.53			
April	1,994	23.84	1,283	15.34	2,395	28.64	2,249	26.98	2,249	26.98	442	5.28			
May	2,500	26.55	1,474	15.65	2,182	23.17	2,690	28.57	2,690	28.57	571	6.06			
June	1,590	21.07	1,390	18.42	2,170	28.75	1,882	24.93	1,882	24.93	516	6.83			
July	1,860	23.12	1,330	16.53	1,438	17.87	3,144	39.08	3,144	39.08	273	3.40			
August	2,460	29.53	927	11.12	1,867	22.41	2,765	33.19	2,765	33.19	312	3.75			
September	2,173	28.65	448	5.91	1,589	20.94	3,265	43.05	3,265	43.05	109	1.44			
October	2,288	31.91	171	2.38	1,756	24.49	2,775	33.74	2,775	33.74	181	2.52			

N.A. = Not Available

Source: U.S. Department of Commerce.

Gross Margin
Analysis-
Research
Procedures

Data on South Korean and Taiwan operations were obtained from U.S. agricultural attache reports from South Korea and Taiwan via the Foreign Agricultural Service. U.S. data were obtained from the annual estimates prepared by the Statistical Reporting Service of the U.S. Department of Agriculture. General information and data on mushrooms were obtained from USITC reports prepared for investigations and hearings held in response to the petition filed by the AMI.

The size of cans used for processed mushrooms range from 2 to 68 ounces, with two sizes, 4- and 68-ounce, accounting for most of the canned mushrooms sold in the U.S. Trade sources indicated that approximately 60 percent of all imports of canned mushrooms are packed in the 68-ounce or Number 10 can. The same sources also indicated that approximately 80 percent of the total consumption of canned mushrooms in the United States is in the form of stems and pieces.^{1/} The remainder is consumed in the form of slices and/or whole mushrooms. The analysis was limited to cases of six 68-ounce and twenty-four 4-ounce cans of mushrooms, and two styles--stems and pieces, and slices and/or wholes--from the United States, Taiwan, and South Korea.

The selected case values were broken down into major components for purposes of the comparison. The major components for the U.S. pack included raw product cost, container cost, and the gross processing margin (i.e., all other processing costs plus profits). The South Korean and Taiwan pack included raw product cost, freight cost, tariff expense (both old and new), and the gross processing margin. Gross processing margins do not yield a perfect comparison of the relative competitive positions of foreign and domestic canners, since they do not reflect differences in processing costs. In view of lower labor costs of foreign canners and the high level of processing technology reportedly utilized by them, it is probable that foreign canners have lower processing costs than do domestic operators. To this extent, the analysis understates the profitability of foreign canners.

Raw Product Costs

The raw product cost for both foreign and domestic canners is the cost associated with the price paid to growers for fresh

^{1/} International Trade Centre UNCTAD/GATT, "Major Markets for Canned Mushrooms," Geneva, 1979, (ITC publication). This publication defines the various mushroom styles as follows: "Stems and pieces"--Pieces of the cap and stem of irregular sizes and shape. "Slices"--Mushrooms cut into slices 2mm to 8mm thick, of which not less than 50 percent are cut parallel to the axis of the mushroom. "Wholes"--Whole mushrooms, with attached stems, cut to a length not exceeding the diameter of the cap, measured from the bottom of the veil.

mushrooms. A case of six 68-ounce (No. 10) cans of mushrooms contains 25.5 pounds drained weight of mushrooms. It requires 1.538 pounds of fresh mushrooms to yield 1 pound drained weight of processed mushrooms. This ratio converts to 39.22 pounds of fresh mushrooms per case of six 68-ounce cans. A case of twenty-four 4-ounce cans contains 6 pounds drained weight of mushrooms, requiring 9.23 pounds of fresh mushrooms per case. The weighted average cost of fresh mushrooms to processors amounted to 57.6 cents 2/, 30.55 3/, and 32.11 4/ cents for the United States, Taiwan, and South Korea, respectively, in 1980. Total pounds of fresh mushroom equivalents per case of processed product were multiplied by the price canners paid growers for fresh mushrooms to yield a total raw product cost per case. Total raw product cost was divided by the value of each case of mushrooms to obtain a percentage cost contribution for raw product as a function of case value.

Container Costs 5/

The container cost contribution for each case of canned mushrooms was based on the price canners paid for cans, closures, labels, and cartons. South Korean canners had container costs of \$3.08 and \$1.88 per case of six 68-ounce cans and twenty-four 4-ounce cans, respectively, in 1980. (Data on Taiwan canners' container costs for 1980 were not available, therefore, they were assumed to be the same as those obtained for South Korean canners.) Container costs for domestic canners per case of six 68-ounce cans and per case of twenty-four 4-ounce cans amounted to \$3.18 and \$2.13, respectively, in the same period. 6/

Freight Costs 7/

Freight costs were assumed applicable only to imported mushrooms in this comparison. 8/ On the average, freight costs

2/ Price quoted from "Mushrooms," Crop Reporting Board, ESCS, USDA, August 13, 1980.

3/ Price computed from agricultural attache reports.

4/ Op. Cit.

5/ The cost of containers in a given size case was divided by the value of an equivalent size case of each style of mushrooms to yield a percentage cost contribution for containers.

6/ Cost obtained from an east coast can supplier.

7/ This cost was divided by the value of each case to yield a percentage cost contribution for freight on the imported product.

8/ Costs computed from rates filed with the Federal Maritime Commission.

amounted to \$1,750 for 17 metric tons shipped from South Korea to the U.S. east coast. This amounted to \$1.19 per case of six 68-ounce cans of processed product and 28 cents per case of twenty-four 4-ounce cans of product. Freight costs amounted to \$1,292 ^{9/} for 17 metric tons shipped from Taiwan to the U.S. east coast. This amounted to 88 cents per case of six 68-ounce cans of processed product and 21 cents per case of twenty-four 4-ounce cans.

Tariff Charges 10/

Tariff costs were applicable only to the imported pack. Tariffs on canned mushroom imports, prior to November 1, 1980, amounted to 3.2 cents per pound drained weight plus 10 percent ad valorem. Tariff charges after November 1, 1980, were calculated at 3.2 cents per pound drained weight plus 30 percent ad valorem. The ad valorem percentage was applied to the plant value (f.o.b. plant price) of a case of mushrooms of each container size and style of pack.

9/ Imported and domestically canned mushrooms compete primarily in eastern markets.

10/ The percentage tariff cost contribution was calculated at 3.2 cents per pound plus the ad valorem contribution divided by the value of the case.

The Mushroom
Production
Process

Commercial production of mushrooms, *agaricus bisporus*, is a technically complex, labor intensive activity requiring a substantial capital investment. Successful mushroom production entails elements of both art and science since many of the critical production parameters are subject to limited control. Technological improvements over the years have increased the importance of the scientific element at the expense of the art (human) element. They have also made the industry more capital intensive. Despite these improvements, the human element remains significant. Good growers are identifiable and respected members in the mushroom producer community. Their reputations are supported by an ability to obtain consistently high yields of quality product.

An understanding of the mushroom production process appears crucial to an understanding of the industry. Producers' ability or inability to adjust to changes in markets, consumer demand, factor costs, import competition, and other destabilizing forces may be attributable, at least in part, to the complexity of the production process. The following section outlines the essential features of mushroom production technology.

Production Systems Two distinct production technologies and several subtechnologies (modifications of a major technological type) are currently utilized by the mushroom industry. The bed system, the more common and older technology, is more labor intensive. The tray system is more capital intensive and is best adapted to relatively high volume operations. Each of these technologies is discussed in order.

The Bed System The bed system is characterized by a specialized production facility known as a "double," a concrete block building normally 60 feet by 38 feet containing 8,000 square feet of growing area. This conventional double house contains four blocks of mushroom beds, six tiers high, with alleys in between. These specifications are commonly quoted but are not universal. A double house can range from 48 to 72 feet in length and the growing area from 6,000 to 12,000 square feet. ^{1/} In some cases, the vertical dimensions are also increased to provide spaces for additional tiers of beds.

Each mushroom bed is approximately 6 inches deep. In practice, beds are overfilled with compost, raising the center of the compost in a crown approximately 10 inches above the floor of the bed. A well-filled, conventionally sized double will contain from 180 to 200 cubic yards of compost.

^{1/} Houses have been constructed as long as 94 feet, but this size is relatively uncommon.

Mushroom production involves two phases: Phase I—outdoor compost preparation, and Phase II—indoor pasteurization. Phase I is a common element in both the bed and tray systems. The operation is accomplished on a concrete wharf (dock or hardstand) and consists of mixing and watering the selected compost materials to promote bacterial action and break down the herbaceous matter. Major equipment requirements are industrial type front-end loaders and specialized turning equipment. The objective of Phase I operations is to produce a uniform well-watered (70 percent moisture) supplemented medium for mushroom growth. The nitrogen and moisture content of the finished compost is indicative of its quality. High quality compost should have a nitrogen level of 1.8 to 2 percent. Levels below 1.8 percent will result in reduced yields of mushrooms due to nitrogen limitations. Levels above 2 percent generally indicate some residue of ammonia, which is toxic to mushrooms.

Compost is prepared from a mixture of basic ingredients and supplements. The basic ingredients are horse manure, hay, and corn cobs. These ingredients provide bulk, hence support for the crop, and some of the necessary nutrients. A compost prepared from hay and corn cobs or from hay alone is termed "synthetic." A "mixture" is a compost with varying amounts of horse manure and synthetics. Supplements are generally nitrogenous source materials such as cotton seed meal, brewers' dried grains, urea, ammonium nitrate, and chicken manure. Nonnitrogenous supplements are gypsum and potash. Gypsum is added to promote a compost structure that will facilitate aeration and to reduce acid level. Potash is added to synthetic and mixed composts to provide an essential mushroom nutrient in which these materials are otherwise deficient.

When the composting operation (phase I) is complete, compost is loaded into beds in a "double" and the phase II operation starts. Phase II consists of a pasteurization process (cookout) wherein the compost in the beds is raised, over stages, to a temperature of 140°F (60°C) and maintained at this temperature for at least 4 hours. The process of raising the temperature is generally accomplished by a combination of bacterial action on the compost and the introduction of live steam. Pasteurization accomplishes two purposes; it converts free ammonia in the compost to nitrogen through the action of thermophilic bacteria which grow at temperatures between 125° and 135°F (52- 57°C) and it also destroys undesirable insects, mites, fungi, and bacteria.

Spawn is the mushroom plant. It is produced by innoculating a small grain, usually wheat or rye, with mushroom seeds (spores) under carefully controlled conditions. In appearance, spawn

can best be described as moldy grain. The recommended spawn application rate for a desired spawn penetration of 6 inches or more is one bottle for every 10 square feet of growing area or 800 bottles for a conventionally sized double. A high spawn application rate shortens the spawning run and ensures better nutrient availability to the crop. Spawn is planted in the compost after the temperature has been reduced to 75°F and the compost is free of ammonia. The nitrogen and moisture content of the compost at this point should be 2.2 and 70 percent, respectively.

On completion of the spawning (spawn planting operation) the temperature of the beds is lowered to 70°F (22°C) for approximately 1 week. This is followed by lowering the temperature to 65° (19°C) for an additional 1 to 2 weeks. Temperature is controlled through ventilation and the beds are watered to maintain a moisture content of 65 percent in the compost. After 2 weeks, the mycelium (fungi root system) will penetrate most of the compost which takes on a moldy look and, in the latter phases, a mushroom smell. At this time casing soil is added on top of the compost in a layer ranging from 1 to 1-1/4 inches. The casing operation is necessary in order to induce the mushroom mycelium to fruit (make mushrooms). Casing soil is obtained from a number of sources: clay loam top soil stripped from farm land, peat, or recycled compost. The second and third alternatives are probably the most common. The recycling procedure requires approximately 3 years of weathering of the spent compost during which period the spent compost is plowed and turned one or two times per year.

Casing constitutes the final step in phase II. Subsequent steps, those necessary to induce maximum mushroom growth, require careful control of the following parameters: bed and room temperature, humidity, bed moisture, and air composition (CO₂ content). These parameters are controlled by hand watering the beds and ventilation. A major difference between good growers and average growers is in their respective abilities to control these critical production parameters to obtain maximum mushroom production.

Mushrooms are ready for harvest within 2 to 3 weeks after the casing soil is added. Appearance of the mushrooms on the surface of the bed or tray is termed a "break" or a "flush." All mushrooms of appreciable size are harvested as soon as the flush is complete, dead material is cleaned from the beds or trays, and the system prepared for a subsequent flush. Each bed or tray experiences a number of flushes with maximum production obtained during the first and, sometimes, second flush. The usual practice is to terminate production with the fifth flush. In some instances, however, the production process is terminated after the fourth flush, an individual

management decision based upon expected yields of the fifth or subsequent flushes, costs of starting a new cycle, and current and expected market prices of mushrooms.

The Tray System

In the tray system, individual mushroom growing trays are loaded with compost mechanically and transported to separate rooms in which pasteurization takes place. After pasteurization, the trays are removed from the rooms, spawn is added and mixed, and the tray is transported to a second set of rooms for the "spawn run," the period during which the mushroom mycelium penetrates the compost. When the spawn run is complete, sterile casing soil is added, and the trays moved to a third room for completion of the growth period and subsequent harvesting of the mushrooms. Environmental controls in both the spawn and growing rooms are maintained in the same fashion as those in the double.

Bed-type systems operate with a cycle ranging from 72 to 100 days. A cycle is measured from the time a bed is filled with compost until the bed is emptied of spent compost, ready for a new fill. Tray operators have no cycle since the system is designed to operate continuously with only a short interval between the time a tray is emptied and refilled with fresh compost. In all tray operations and in most bed operations, both the spent compost and the tray or bed are sterilized at the end of the production cycle. Consequently, the spent compost which leaves the growing house is relatively free of disease and insect pests. This practice is not universal among bed-type operators and, in concentrated production areas such as Chester County (the Kennett Square area), disease and insect problems are probably more serious than in less concentrated production areas.

A modification of either or both of the above described tray or bed technologies is found in some areas of the United States. This modification involves the use of limestone mines or caves in lieu of the concrete block double. The modified system involves much of the same phase I and phase II techniques with respect to composting, pasteurizing, casing, and harvesting. The environmental control required for the growing operation takes advantage of uniform climatic conditions which exist in the mine or caves which, with some modification using forced air, are ideal for mushroom production. Disease and insect control problems are, however, probably more serious in cave operations due to an inability to sterilize the growing chambers.

Other modifications of the basic bed and tray systems are currently operating both in the United States and in foreign countries. One involves bulk pasteurization of compost,

phase II, in specialized facilities (tunnels) followed by spawning and loading into trays or beds for the growing operation. A small number of plants utilize bulk pasteurization followed by spawning and mechanized loading into plastic bags approximately 20 inches in diameter by 24 inches deep. The loaded bags are subsequently placed on two-tiered movable trays which are wheeled into environmentally controlled chambers for the growing operation.

Improved technology in mushroom production has, to a large extent, concentrated on improving the degree of control over those environmental parameters necessary for optimum production. Initially, commercial production was limited to the fall and winter months when the normal environment could be regulated within the desired temperature ranges through simple ventilating procedures. Subsequently, the need to improve plant productivity and to meet changes in market demand encouraged the adoption of air-conditioning equipment, which permitted the expansion of production into the summer months. Most modern mushroom plants currently utilize relatively high-cost air-moving equipment that provides a wide range of temperature and air control without regard to the temperature of the external environment.

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